

=> FIL WPIX  
FILE 'WPIX' ENTERED AT 12:33:39 ON 20 SEP 2010  
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'BI ABEX BIE' IS DEFAULT SEARCH FIELD FOR 'WPIX' FILE

=> D HIS NOFILE

INDEX '1MOBILITY, 2MOBILITY, ABI-INFORM, ADISCTI, AEROSPACE,  
AGRICOLA, ALUMINIUM, ANABSTR, ANTE, APOLLIT, AQUALINE, AQUASCI,  
AQUIRE, BABS, BIBLIODATA, BIOENG, BIOSIS, BIOTECHABS, BIOTECHDS,  
BIOTECHNO, CABA, CAPLUS, CASREACT, CBNB, CEABA-VTB, CERAB,  
CHEMINFORMRX,' ENTERED AT 10:27:35 ON 20 SEP 2010  
SEA CARBON# AND NANOTUB?

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29 FILE 1MOBILITY  
477 FILE ABI-INFORM  
3506 FILE AEROSPACE  
658 FILE AGRICOLA  
636 FILE ALUMINIUM  
1061 FILE ANABSTR  
2712 FILE ANTE  
523 FILE APOLLIT  
71 FILE AQUALINE  
38 FILE AQUASCI  
2049 FILE BABS  
114 FILE BIBLIODATA  
1213 FILE BIOENG  
2355 FILE BIOSIS  
302 FILE BIOTECHABS  
302 FILE BIOTECHDS  
40 FILE BIOTECHNO  
416 FILE CABA  
71277 FILE CAPLUS  
373 FILE CASREACT  
939 FILE CBNB  
1865 FILE CEABA-VTB  
828 FILE CERAB  
10 FILE CHEMINFORMRX  
176 FILE CIN  
1073 FILE CIVILENG  
36384 FILE COMPENDEX  
780 FILE COMPUAB  
2 FILE COMFUSCENCE  
684 FILE CONFSCI  
98 FILE COPPERLIT  
131 FILE CORROSION  
1 FILE CROFU  
146 FILE CSNB  
28 FILE DDFU  
1112 FILE DGENE  
1657 FILE DISSABS  
17 FILE DKF  
29 FILE DRUGU  
2128 FILE ELCOM  
10463 FILE EMA  
133 FILE EMBAL  
6982 FILE EMBASE  
1839 FILE ENCOMPLIT  
2264 FILE ENCOMPPAT

4913 FILE ENERGY  
233 FILE ENVIROENG  
3874 FILE EPFULL  
2097 FILE ESBIOBASE  
136 FILE FRANCEPAT  
565 FILE FRFULL  
48 FILE FROSTI  
114 FILE FSTA  
251 FILE GBFULL  
68 FILE GENBANK  
24 FILE GEOREF  
28 FILE HEALSAFE  
1 FILE IFICLS  
10471 FILE IFIPAT  
3 FILE IMSDRUGNEWS  
1 FILE INFODATA  
3561 FILE INIS  
13171 FILE INPADOCDB  
7576 FILE INPAFAMDB  
32822 FILE INSPEC  
1 FILE INSPHYS  
121 FILE IPA  
4 FILE ITRD  
2893 FILE JAPIO  
1193 FILE KOREAPAT  
17 FILE KOSMET  
1493 FILE LIFESCI  
6 FILE LISA  
191 FILE MATBUS  
2512 FILE MECHENG  
8016 FILE MEDLINE  
6495 FILE METADEX  
1736 FILE NLDB  
743 FILE NTIS  
4 FILE OCEAN  
20467 FILE PASCAL  
51 FILE PATDPA  
531 FILE PATDPAFULL  
3170 FILE PCI  
8645 FILE PCTFULL  
15 FILE PCTGEN  
438 FILE PIRA  
67 FILE POLLUAB  
2490 FILE PROMT  
3365 FILE RAPRA  
3 FILE RDISCLOSURE  
81 FILE RUSSIAPAT  
53313 FILE SCISEARCH  
8536 FILE SOLIDSTATE  
9010 FILE TEMA  
44 FILE TEXTILETECH  
4371 FILE TOXCENTER  
40 FILE TRIBO  
38 FILE TULSA  
20 FILE TULSA2  
47 FILE UFORDAT  
5 FILE ULIDAT  
1592 FILE USGENE  
19199 FILE USPATFULL  
5978 FILE USPAT2

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      88   FILE WATER
      23   FILE WELDASEARCH
    12978   FILE WPIDS
    12978   FILE WPINDEX
      359   FILE WSCA
      994   FILE WTEXTILES
L1      QUE SPE=ON  ABB=ON  PLU=ON  CARBON# AND NANOTUB?
      -----
      FILE 'WPIX' ENTERED AT 10:54:45 ON 20 SEP 2010
      E US20070280876/PN
L2      1 SEA SPE=ON  ABB=ON  PLU=ON  US20070280876/PN
      SEL L2 AU
L3      90 SEA SPE=ON  ABB=ON  PLU=ON  ("DYKE C R"/IN OR "HUDSON J
      L"/IN OR "STEPHENSON J J"/IN OR "TOUR J M"/IN)
      SEL L2 PA
L4      298 SEA SPE=ON  ABB=ON  PLU=ON  "UNIV RICE WILLIAM MARSH"/PA
L5      QUE SPE=ON  ABB=ON  PLU=ON  CARBON#/BI, ABEX, BIEX OR
      C/BI, ABEX, BIEX
L6      18412 SEA SPE=ON  ABB=ON  PLU=ON  NANOTUB?/BI, ABEX, BIEX OR
      NANO/BI, ABEX, BIEX (2A) TUB?/BI, ABEX, BIEX
L7      280 SEA SPE=ON  ABB=ON  PLU=ON  SWCNT/BI, ABEX, BIEX OR
      SWCN/BI, ABEX, BIEX OR SCNT/BI, ABEX, BIEX OR DWCNT/BI, ABEX, B
      IEX OR DWCN/BI, ABEX, BIEX OR DCNT/BI, ABEX, BIEX OR
      MWCNT/BI, ABEX, BIEX OR MWCN/BI, ABEX, BIEX OR MCNT/BI, ABEX, B
      IEX
L8      QUE SPE=ON  ABB=ON  PLU=ON  ACID####/BI, ABEX, BIEX OR
      SUPERACID####/BI, ABEX, BIEX OR OXOACID####/BI, ABEX, BIEX
L9      4807 SEA SPE=ON  ABB=ON  PLU=ON  OLEUM?/BI, ABEX, BIEX OR
      CHLOROSULFONIC?/BI, ABEX, BIEX OR CHLOROSULPHONIC?/BI, ABEX,
      BIEX OR TRIFLIC?/BI, ABEX, BIEX OR CHLORO/BI, ABEX, BIEX
      (2A) (SULFONIC?/BI, ABEX, BIEX OR SULPHONIC?/BI, ABEX, BIEX)
L10     222988 SEA SPE=ON  ABB=ON  PLU=ON  H2SO4/BI, ABEX, BIEX OR
      H3PO4/BI, ABEX, BIEX OR HClO4/BI, ABEX, BIEX OR HNO3/BI, ABEX,
      BIEX OR SULFURIC?/BI, ABEX, BIEX OR SULPHURIC?/BI, ABEX, BIEX
      OR PHOSPHORIC?/BI, ABEX, BIEX OR HYPOCHLORATE?/BI, ABEX, BIE
      X OR NITRIC?/BI, ABEX, BIEX OR PERSULFATE?/BI, ABEX, BIEX OR
      PERSULPHATE?/BI, ABEX, BIEX
L11     63538 SEA SPE=ON  ABB=ON  PLU=ON  ?DIAZONIUM?/BI, ABEX, BIEX OR
      ?HALONIUM?/BI, ABEX, BIEX OR ?ANILINE?/BI, ABEX, BIEX OR
      ?NITRITE?/BI, ABEX, BIEX OR ?SULFANIL?/BI, ABEX, BIEX OR
      ?SULPHANIL?/BI, ABEX, BIEX OR ?TRIAZENE?/BI, ABEX, BIEX
L12     QUE SPE=ON  ABB=ON  PLU=ON  (PURIF?/BI, ABEX, BIEX OR
      SEPARAT?/BI, ABEX, BIEX OR SEP#/BI, ABEX, BIEX OR ISOLAT?/BI,
      ABEX, BIEX OR FILT?/BI, ABEX, BIEX OR MICROFILT?/BI, ABEX, BIE
      X OR ULTRAFILT?/BI, ABEX, BIEX OR SIEVE?/BI, ABEX, BIEX OR
      CHROMATOG?/BI, ABEX, BIEX)
L13     15794 SEA SPE=ON  ABB=ON  PLU=ON  L5 (2A) L6
L14     15870 SEA SPE=ON  ABB=ON  PLU=ON  L13 OR L7
L15     3296 SEA SPE=ON  ABB=ON  PLU=ON  L14 AND L8
L16     32 SEA SPE=ON  ABB=ON  PLU=ON  L15 AND L9
L17     1026 SEA SPE=ON  ABB=ON  PLU=ON  L15 AND L10
L18     1034 SEA SPE=ON  ABB=ON  PLU=ON  L16 OR L17
L19     112 SEA SPE=ON  ABB=ON  PLU=ON  L18 AND L11
L20     68 SEA SPE=ON  ABB=ON  PLU=ON  L19 AND L12
L21     11956 SEA SPE=ON  ABB=ON  PLU=ON  C01B0031-02/IPC
L22     3790 SEA SPE=ON  ABB=ON  PLU=ON  (E05-U OR E05-U04 OR E05-U03
      OR E05-U03A OR E05-U03B OR E05-U03C)/MC
L23     39430 SEA SPE=ON  ABB=ON  PLU=ON  (0610 OR 0899 OR 1018 OR

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1711 OR 1724 OR 1824 OR 1834)/DRN  
 L24 36 SEA SPE=ON ABB=ON PLU=ON L19 AND L21  
 L25 34 SEA SPE=ON ABB=ON PLU=ON L19 AND L22  
 L26 13 SEA SPE=ON ABB=ON PLU=ON L19 AND L23  
 L27 28 SEA SPE=ON ABB=ON PLU=ON L20 AND L21  
 L28 22 SEA SPE=ON ABB=ON PLU=ON L20 AND L22  
 L29 6 SEA SPE=ON ABB=ON PLU=ON L20 AND L23  
 L30 51 SEA SPE=ON ABB=ON PLU=ON (L24 OR L25 OR L26 OR L27 OR  
 L28 OR L29)  
 L31 4 SEA SPE=ON ABB=ON PLU=ON L30 AND ((L3 OR L4))  
 L32 47 SEA SPE=ON ABB=ON PLU=ON L30 NOT L31  
 L33 18 SEA SPE=ON ABB=ON PLU=ON 1802-2005/PY,PRY,AY AND L32

FILE 'HCAPLUS' ENTERED AT 11:14:06 ON 20 SEP 2010

L34 1 SEA SPE=ON ABB=ON PLU=ON US20070280876/PN  
 SEL L34 RN

FILE 'REGISTRY' ENTERED AT 11:15:27 ON 20 SEP 2010

L35 23 SEA SPE=ON ABB=ON PLU=ON (7440-44-0/BI OR 100-01-6/BI  
 L36 1 SEA SPE=ON ABB=ON PLU=ON 7440-44-0

FILE 'HCAPLUS' ENTERED AT 11:23:32 ON 20 SEP 2010

L37 40268 SEA SPE=ON ABB=ON PLU=ON L36/P  
 L38 70607 SEA SPE=ON ABB=ON PLU=ON L5 (2A) L6  
 L39 8156 SEA SPE=ON ABB=ON PLU=ON SWCNT/BI,ABEX,BIEX OR  
 SWCN/BI,ABEX,BIEX OR SCNT/BI,ABEX,BIEX OR DWCNT/BI,ABEX,B  
 IEX OR DCNT/BI,ABEX,BIEX OR MCNT/BI,ABEX,BIEX OR  
 MWNT/BI,ABEX,BIEX OR MCNT/BI,ABEX,BIEX OR MCNT/BI,ABEX,B  
 IEX

L40 71128 SEA SPE=ON ABB=ON PLU=ON L38 OR L39  
 L41 9107 SEA SPE=ON ABB=ON PLU=ON L40 AND L8  
 L42 41 SEA SPE=ON ABB=ON PLU=ON L41 AND L9  
 L43 2775 SEA SPE=ON ABB=ON PLU=ON L41 AND L10  
 L44 2790 SEA SPE=ON ABB=ON PLU=ON (L42 OR L43)  
 L45 191 SEA SPE=ON ABB=ON PLU=ON L44 AND L11  
 L46 41 SEA SPE=ON ABB=ON PLU=ON L45 AND L12  
 L47 11 SEA SPE=ON ABB=ON PLU=ON L46 AND L37

FILE 'WPIX' ENTERED AT 11:26:07 ON 20 SEP 2010

L48 22 SEA SPE=ON ABB=ON PLU=ON L31 OR L33  
 SEL L48 1- PN,APPS

FILE 'HCAPLUS' ENTERED AT 11:26:36 ON 20 SEP 2010

L49 25 SEA SPE=ON ABB=ON PLU=ON (WO2006-KR754/APPS OR  
 L50 8 SEA SPE=ON ABB=ON PLU=ON L47 NOT L49  
 L51 1 SEA SPE=ON ABB=ON PLU=ON 1802-2005/PY,PRY,AY AND L50  
 L52 30 SEA SPE=ON ABB=ON PLU=ON L45 AND L37  
 L53 27 SEA SPE=ON ABB=ON PLU=ON L52 NOT L49  
 L54 7 SEA SPE=ON ABB=ON PLU=ON 1802-2005/PY,PRY,AY AND L53  
 L55 7 SEA SPE=ON ABB=ON PLU=ON L54 OR L51

FILE 'COMPENDEX, INSPEC, PASCAL, EMA, TEMA, SOLIDSTATE, METADEX,  
 JAPIO, MECHENG, ELCOM, CEABA-VTB, DISSABS' ENTERED AT 12:26:13 ON  
 20 SEP 2010

FILE 'COMPENDEX'

L56 36039 SEA SPE=ON ABB=ON PLU=ON L5 (2A) L6

FILE 'INSPEC'

L57 32557 SEA SPE=ON ABB=ON PLU=ON L5 (2A) L6

L58	FILE 'PASCAL'	20041 SEA SPE=ON	ABB=ON	PLU=ON	L5 (2A) L6
L59	FILE 'EMA'	10373 SEA SPE=ON	ABB=ON	PLU=ON	L5 (2A) L6
L60	FILE 'TEMA'	8770 SEA SPE=ON	ABB=ON	PLU=ON	L5 (2A) L6
L61	FILE 'SOLIDSTATE'	8440 SEA SPE=ON	ABB=ON	PLU=ON	L5 (2A) L6
L62	FILE 'METADEX'	6446 SEA SPE=ON	ABB=ON	PLU=ON	L5 (2A) L6
L63	FILE 'JAPIO'	3260 SEA SPE=ON	ABB=ON	PLU=ON	L5 (2A) L6
L64	FILE 'MECHENG'	2507 SEA SPE=ON	ABB=ON	PLU=ON	L5 (2A) L6
L65	FILE 'ELCOM'	2117 SEA SPE=ON	ABB=ON	PLU=ON	L5 (2A) L6
L66	FILE 'CEABA-VTB'	1793 SEA SPE=ON	ABB=ON	PLU=ON	L5 (2A) L6
L67	FILE 'DISSABS'	1623 SEA SPE=ON	ABB=ON	PLU=ON	L5 (2A) L6
L68	TOTAL FOR ALL FILES	133966 SEA SPE=ON	ABB=ON	PLU=ON	L5 (2A) L6
L69	FILE 'COMPENDEX'	3319 SEA SPE=ON	ABB=ON	PLU=ON	L56 AND (L8 OR L10)
L70	FILE 'INSPEC'	1884 SEA SPE=ON	ABB=ON	PLU=ON	L57 AND (L8 OR L10)
L71	FILE 'PASCAL'	1545 SEA SPE=ON	ABB=ON	PLU=ON	L58 AND (L8 OR L10)
L72	FILE 'EMA'	1032 SEA SPE=ON	ABB=ON	PLU=ON	L59 AND (L8 OR L10)
L73	FILE 'TEMA'	928 SEA SPE=ON	ABB=ON	PLU=ON	L60 AND (L8 OR L10)
L74	FILE 'SOLIDSTATE'	898 SEA SPE=ON	ABB=ON	PLU=ON	L61 AND (L8 OR L10)
L75	FILE 'METADEX'	582 SEA SPE=ON	ABB=ON	PLU=ON	L62 AND (L8 OR L10)
L76	FILE 'JAPIO'	138 SEA SPE=ON	ABB=ON	PLU=ON	L63 AND (L8 OR L10)
L77	FILE 'MECHENG'	175 SEA SPE=ON	ABB=ON	PLU=ON	L64 AND (L8 OR L10)
L78	FILE 'ELCOM'	143 SEA SPE=ON	ABB=ON	PLU=ON	L65 AND (L8 OR L10)
L79	FILE 'CEABA-VTB'	252 SEA SPE=ON	ABB=ON	PLU=ON	L66 AND (L8 OR L10)
L80	FILE 'DISSABS'	184 SEA SPE=ON	ABB=ON	PLU=ON	L67 AND (L8 OR L10)
L81	TOTAL FOR ALL FILES	11080 SEA SPE=ON	ABB=ON	PLU=ON	L68 AND (L8 OR L10)
L82	FILE 'COMPENDEX'	15 SEA SPE=ON	ABB=ON	PLU=ON	L56 AND L9
L83	FILE 'INSPEC'	6 SEA SPE=ON	ABB=ON	PLU=ON	L57 AND L9
L84	FILE 'PASCAL'	4 SEA SPE=ON	ABB=ON	PLU=ON	L58 AND L9
L85	FILE 'EMA'	2 SEA SPE=ON	ABB=ON	PLU=ON	L59 AND L9
L86	FILE 'TEMA'	4 SEA SPE=ON	ABB=ON	PLU=ON	L60 AND L9
L87	FILE 'SOLIDSTATE'	4 SEA SPE=ON	ABB=ON	PLU=ON	L61 AND L9

L88	FILE 'METADEX'				
	1 SEA SPE=ON	ABB=ON	PLU=ON	L62 AND L9	
L89	FILE 'JAPIO'				
	0 SEA SPE=ON	ABB=ON	PLU=ON	L63 AND L9	
L90	FILE 'MECHENG'				
	0 SEA SPE=ON	ABB=ON	PLU=ON	L64 AND L9	
L91	FILE 'ELCOM'				
	0 SEA SPE=ON	ABB=ON	PLU=ON	L65 AND L9	
L92	FILE 'CEABA-VTB'				
	0 SEA SPE=ON	ABB=ON	PLU=ON	L66 AND L9	
L93	FILE 'DISSABS'				
	5 SEA SPE=ON	ABB=ON	PLU=ON	L67 AND L9	
L94	TOTAL FOR ALL FILES				
	41 SEA SPE=ON	ABB=ON	PLU=ON	L68 AND L9	
L95	FILE 'COMPEDEX'				
	3320 SEA SPE=ON	ABB=ON	PLU=ON	L69 OR L82	
L96	FILE 'INSPEC'				
	1887 SEA SPE=ON	ABB=ON	PLU=ON	L70 OR L83	
L97	FILE 'PASCAL'				
	1547 SEA SPE=ON	ABB=ON	PLU=ON	L71 OR L84	
L98	FILE 'EMA'				
	1033 SEA SPE=ON	ABB=ON	PLU=ON	L72 OR L85	
L99	FILE 'TEMA'				
	928 SEA SPE=ON	ABB=ON	PLU=ON	L73 OR L86	
L100	FILE 'SOLIDSTATE'				
	899 SEA SPE=ON	ABB=ON	PLU=ON	L74 OR L87	
L101	FILE 'METADEX'				
	583 SEA SPE=ON	ABB=ON	PLU=ON	L75 OR L88	
L102	FILE 'JAPIO'				
	138 SEA SPE=ON	ABB=ON	PLU=ON	L76 OR L89	
L103	FILE 'MECHENG'				
	175 SEA SPE=ON	ABB=ON	PLU=ON	L77 OR L90	
L104	FILE 'ELCOM'				
	143 SEA SPE=ON	ABB=ON	PLU=ON	L78 OR L91	
L105	FILE 'CEABA-VTB'				
	252 SEA SPE=ON	ABB=ON	PLU=ON	L79 OR L92	
L106	FILE 'DISSABS'				
	186 SEA SPE=ON	ABB=ON	PLU=ON	L80 OR L93	
L107	TOTAL FOR ALL FILES				
	11091 SEA SPE=ON	ABB=ON	PLU=ON	L81 OR L94	
L108	FILE 'COMPEDEX'				
	176 SEA SPE=ON	ABB=ON	PLU=ON	L95 AND L11	
L109	FILE 'INSPEC'				
	95 SEA SPE=ON	ABB=ON	PLU=ON	L96 AND L11	
L110	FILE 'PASCAL'				
	91 SEA SPE=ON	ABB=ON	PLU=ON	L97 AND L11	
L111	FILE 'EMA'				
	50 SEA SPE=ON	ABB=ON	PLU=ON	L98 AND L11	
L112	FILE 'TEMA'				
	53 SEA SPE=ON	ABB=ON	PLU=ON	L99 AND L11	
L113	FILE 'SOLIDSTATE'				
	44 SEA SPE=ON	ABB=ON	PLU=ON	L100 AND L11	
L114	FILE 'METADEX'				
	24 SEA SPE=ON	ABB=ON	PLU=ON	L101 AND L11	
L115	FILE 'JAPIO'				
	0 SEA SPE=ON	ABB=ON	PLU=ON	L102 AND L11	
L116	FILE 'MECHENG'				
	5 SEA SPE=ON	ABB=ON	PLU=ON	L103 AND L11	
L117	FILE 'ELCOM'				
	5 SEA SPE=ON	ABB=ON	PLU=ON	L104 AND L11	

L118	FILE 'CEABA-VTB'				
	20 SEA SPE=ON	ABB=ON	PLU=ON	L105 AND L11	
L119	FILE 'DISSABS'				
	12 SEA SPE=ON	ABB=ON	PLU=ON	L106 AND L11	
L120	TOTAL FOR ALL FILES				
	575 SEA SPE=ON	ABB=ON	PLU=ON	L107 AND L11	
L121	FILE 'COMPENDEX'				
	67 SEA SPE=ON	ABB=ON	PLU=ON	L108 AND FUNCTIONAL?	
L122	FILE 'INSPEC'				
	32 SEA SPE=ON	ABB=ON	PLU=ON	L109 AND FUNCTIONAL?	
L123	FILE 'PASCAL'				
	32 SEA SPE=ON	ABB=ON	PLU=ON	L110 AND FUNCTIONAL?	
L124	FILE 'EMA'				
	22 SEA SPE=ON	ABB=ON	PLU=ON	L111 AND FUNCTIONAL?	
L125	FILE 'TEMA'				
	17 SEA SPE=ON	ABB=ON	PLU=ON	L112 AND FUNCTIONAL?	
L126	FILE 'SOLIDSTATE'				
	16 SEA SPE=ON	ABB=ON	PLU=ON	L113 AND FUNCTIONAL?	
L127	FILE 'METADEX'				
	12 SEA SPE=ON	ABB=ON	PLU=ON	L114 AND FUNCTIONAL?	
L128	FILE 'JAPIO'				
	0 SEA SPE=ON	ABB=ON	PLU=ON	L115 AND FUNCTIONAL?	
L129	FILE 'MECHENG'				
	2 SEA SPE=ON	ABB=ON	PLU=ON	L116 AND FUNCTIONAL?	
L130	FILE 'ELCOM'				
	1 SEA SPE=ON	ABB=ON	PLU=ON	L117 AND FUNCTIONAL?	
L131	FILE 'CEABA-VTB'				
	9 SEA SPE=ON	ABB=ON	PLU=ON	L118 AND FUNCTIONAL?	
L132	FILE 'DISSABS'				
	8 SEA SPE=ON	ABB=ON	PLU=ON	L119 AND FUNCTIONAL?	
L133	TOTAL FOR ALL FILES				
	218 SEA SPE=ON	ABB=ON	PLU=ON	L120 AND FUNCTIONAL?	
L134	FILE 'COMPENDEX'				
	7 SEA SPE=ON	ABB=ON	PLU=ON	L121 AND L12	
L135	FILE 'INSPEC'				
	5 SEA SPE=ON	ABB=ON	PLU=ON	L122 AND L12	
L136	FILE 'PASCAL'				
	4 SEA SPE=ON	ABB=ON	PLU=ON	L123 AND L12	
L137	FILE 'EMA'				
	2 SEA SPE=ON	ABB=ON	PLU=ON	L124 AND L12	
L138	FILE 'TEMA'				
	2 SEA SPE=ON	ABB=ON	PLU=ON	L125 AND L12	
L139	FILE 'SOLIDSTATE'				
	1 SEA SPE=ON	ABB=ON	PLU=ON	L126 AND L12	
L140	FILE 'METADEX'				
	0 SEA SPE=ON	ABB=ON	PLU=ON	L127 AND L12	
L141	FILE 'JAPIO'				
	0 SEA SPE=ON	ABB=ON	PLU=ON	L128 AND L12	
L142	FILE 'MECHENG'				
	0 SEA SPE=ON	ABB=ON	PLU=ON	L129 AND L12	
L143	FILE 'ELCOM'				
	0 SEA SPE=ON	ABB=ON	PLU=ON	L130 AND L12	
L144	FILE 'CEABA-VTB'				
	5 SEA SPE=ON	ABB=ON	PLU=ON	L131 AND L12	
L145	FILE 'DISSABS'				
	1 SEA SPE=ON	ABB=ON	PLU=ON	L132 AND L12	
L146	TOTAL FOR ALL FILES				
	27 SEA SPE=ON	ABB=ON	PLU=ON	L133 AND L12	
L147	FILE 'COMPENDEX'				
	0 SEA SPE=ON	ABB=ON	PLU=ON	1802-2005/PY,PRY,AY AND L134	

FILE 'INSPEC'  
L148 0 SEA SPE=ON ABB=ON PLU=ON 1802-2005/PY,PRY,AY AND L135

FILE 'PASCAL'  
L149 0 SEA SPE=ON ABB=ON PLU=ON 1802-2005/PY,PRY,AY AND L136

FILE 'EMA'  
L150 0 SEA SPE=ON ABB=ON PLU=ON 1802-2005/PY,PRY,AY AND L137

FILE 'TEMA'  
L151 0 SEA SPE=ON ABB=ON PLU=ON 1802-2005/PY,PRY,AY AND L138

FILE 'SOLIDSTATE'  
L152 0 SEA SPE=ON ABB=ON PLU=ON 1802-2005/PY,PRY,AY AND L139

FILE 'METADEX'  
L153 0 SEA SPE=ON ABB=ON PLU=ON 1802-2005/PY,PRY,AY AND L140

FILE 'JAPIO'  
L154 0 SEA SPE=ON ABB=ON PLU=ON 1802-2005/PY,PRY,AY AND L141

FILE 'MECHENG'  
L155 0 SEA SPE=ON ABB=ON PLU=ON 1802-2005/PY,PRY,AY AND L142

FILE 'ELCOM'  
L156 0 SEA SPE=ON ABB=ON PLU=ON 1802-2005/PY,PRY,AY AND L143

FILE 'CEABA-VTB'  
L157 3 SEA SPE=ON ABB=ON PLU=ON 1802-2005/PY,PRY,AY AND L144

FILE 'DISSABS'  
L158 0 SEA SPE=ON ABB=ON PLU=ON 1802-2005/PY,PRY,AY AND L145

TOTAL FOR ALL FILES  
L159 3 SEA SPE=ON ABB=ON PLU=ON 1802-2005/PY,PRY,AY AND L146

L160 3 DUP REM L159 (0 DUPLICATES REMOVED)  
ANSWERS '1-3' FROM FILE CEABA-VTB

FILE 'HCAPLUS, CEABA-VTB' ENTERED AT 12:32:51 ON 20 SEP 2010  
L161 10 DUP REM L55 L160 (0 DUPLICATES REMOVED)  
ANSWERS '1-7' FROM FILE HCAPLUS  
ANSWERS '8-10' FROM FILE CEABA-VTB

FILE 'WPIX' ENTERED AT 12:33:39 ON 20 SEP 2010

=> D L31 1-4 IFULL

L31 ANSWER 1 OF 4 WPIX COPYRIGHT 2010 THOMSON REUTERS on STN  
ACCESSION NUMBER: 2008-G84372 [200843] WPIX  
TITLE: Polymer additive for making polymer-based composite  
fiber or film, comprises short functionalized  
carbon nanotubes readily soluble  
in solvent  
DERWENT CLASS: A94  
INVENTOR: CHEN Z; HWANG W; TOUR J M  
PATENT ASSIGNEE: (UYRW-C) UNIV RICE WILLIAM MARSH



COUNTRY COUNT: 117

## PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
WO 2008054836	A2	20080508	(200843)*	EN	46	[18]
WO 2008054836	A3	20080724	(200851)	EN		
WO 2008054836	A9	20090716	(200947)	EN		
US 20090215953	A1	20090827	(200957)	EN		

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2008054836	A2	WO 2007-US62570	20070222
WO 2008054836	A9	WO 2007-US62570	20070222
US 20090215953	A1 Provisional	US 2006-775635P	20060222
US 20090215953	A1 Provisional	US 2006-835001P	20060802
US 20090215953	A1 PCT Application	WO 2007-US62570	20070222
US 20090215953	A1	US 2009-280523	20090115

PRIORITY APPLN. INFO: US 2006-835001P 20060802  
 US 2006-775635P 20060222  
 US 2009-280523 20090115

## INT. PATENT CLASSIF.:

## IPC ORIGINAL:

C01B0031-02 [I,A]; C08K0003-04 [I,A];  
 C08K0003-04 [I,A]; C08K0007-24 [I,A]; C08L [I,S];  
 C09K0003-00 [I,A]; D01F0009-12 [I,A]; C01B0031-00  
 [I,C]; C08K0003-00 [I,C]; C08K0003-00 [I,C];  
 C08K0007-00 [I,C]; C09K0003-00 [I,C]; D01F0009-12  
 [I,C]

## ECLA:

C01B0031-02B

## ICO:

Y01N0006:00

## USCLASS NCLM:

524/496.000

## NCLS:

252/182.320; 423/447.100; 423/447.200; 977/742.000;  
 977/745.000

## BASIC ABSTRACT:

WO 2008054836 A2 UPAB: 20080707

NOVELTY - A polymer additive comprises short functionalized carbon nanotubes readily soluble in a solvent.

## DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for:

(1) making the polymer additive comprising intercalating carbon nanotubes with an intercalation agent; and reacting the carbon nanotubes with a reactive agent that simultaneously reduces the length of the carbon nanotubes and functionalizes the carbon nanotubes;

(2) polymer-based composite material, comprising a polymer; and short functionalized, carbon nanotubes homogeneously dispersed in the polymer; and

(3) making a polymer-based composite material, comprising dissolving the additive in a first solvent so as to produce a first solution; and blending the first solution with a polymer resin so as to produce a homogeneously dispersed polymer mixture.

USE - The additive is used for making a polymer-based composite material such as fiber of film (claimed).

ADVANTAGE - The nanotubes of the additive have improved solubility, dispersity, and processibility with solvents, monomers, and polymers; and provide composite material having improved tensile and modulus properties with respect to a comparable material lacking the carbon nanotubes. TECHNOLOGY FOCUS:

INORGANIC CHEMISTRY - Preferred Components: The reactive agent is chemically compatible or miscible with the intercalation

agent. The reactive agent comprises nitric acid, mixture of sulfuric acid and hydrogen peroxide, or ozone.

ORGANIC CHEMISTRY - Preferred Components: The solvent is water, alcohols, aprotic solutions, and/or acidic solutions. The intercalation agent comprises oleum. The second solvent is chemically compatible and miscible with the first solvent. Preferred Compositions: The additive is soluble at a concentration at least 10 mg/mL. The average length of the carbon nanotubes is less than 200 (preferably less than 100) nm.

POLYMERS - Preferred Method: The process further comprises curing the polymer mixture, extruding the polymer mixture into a fiber, casting the polymer mixture into a film, molding the polymer mixture into a shaped article, and/or derivatizing the short functionalized, carbon nanotubes to improve solubility in the first solvent. The derivatizing step comprises derivatizing with a nucleophilic material such as ammonia, an aryl diazonium moiety, a polyethylene glycol moiety or an oligoethylene glycol moiety. The polymer resin is dissolved in a second solvent before the blending step. Preferred Materials: The polymer comprises a thermosetting polymer such as epoxy resin; thermoplastic polymer such as nylon (6,6); block co-polymer; polyacrylonitrile; polyamide; high-temperature polymer such as poly(p-phenylene benzobisoxazole), poly(p-phenylene terephthalamide) or poly(p-phenylene benzthiazole); rubber such as nitrile-butadiene rubber or hydrogenated nitrilebutadiene rubber; urethane; or fluoropolymer.

FILE SEGMENT: CPI  
MANUAL CODE: CPI: A08-R03; A11-A03; A12-S05X; A12-S06A

L31 ANSWER 2 OF 4 WPIX COPYRIGHT 2010 THOMSON REUTERS on STN

ACCESSION NUMBER: 2005-797526 [200581] WPIX  
TITLE: Functionalization of carbon nanotube such as single wall carbon nanotubes, involves dispersing carbon nanotubes in

acidic medium, and functionalizing dispersed nanotubes by covalently attaching functional groups to exposed sidewalls

DERWENT CLASS: E36

INVENTOR: DYKE C R; HUDSON J L;  
STEPHENSON J J; TOUR J M

PATENT ASSIGNEE: (UYRW-C) UNIV RICE WILLIAM MARSH

COUNTRY COUNT: 107

#### PATENT INFORMATION:

PATENT NO	KIND DATE	WEEK	LA	PG	MAIN IPC
WO 2005113434	A1 20051201 (200581)*	EN	33	[13]	
US 20070280876	A1 20071206 (200781)	EN			

#### APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2005113434	A1	WO 2005-US9677	20050324
US 20070280876	A1 Provisional	US 2004-556250P	20040325
US 20070280876	A1	WO 2005-US9677	20050324

US 20070280876 A1

US 2007-593918 20070806

PRIORITY APPLN. INFO: US 2004-556250P 20040325  
US 2007-593918 20070806

## INT. PATENT CLASSIF.:

IPC ORIGINAL: C01B0031-00 [I,C]; C01B0031-02 [I,A]  
IPC RECLASSIF.: C01B0031-00 [I,C]; C01B0031-02 [I,A]  
ECLA: C01B0031-02B  
ICO: Y01N0006:00  
USCLASS NCLM: 423/460.000

## BASIC ABSTRACT:

WO 2005113434 A1 UPAB: 20060125

NOVELTY - Carbon nanotubes are dispersed in an acidic medium, to form dispersed carbon nanotubes with substantially exposed sidewalls. The dispersed carbon nanotubes are functionalized by covalently attaching the functional groups to their substantially exposed sidewalls, to obtain sidewall functionalized carbon nanotubes.

USE - For functionalizing carbon nanotubes such as single wall, double wall, multi-wall and small diameter carbon nanotubes, in acidic medium, used for electronic, biomedical and structural composite materials.

ADVANTAGE - The method is easily scalable, and provides sidewall functionalized carbon nanotubes in large quantities, without requiring ultrasonication or non-covalent wrapping to afford suspension and subsequent functionalization.

DESCRIPTION OF DRAWINGS - The graph shows the Raman spectrum of functionalized single wall carbon nanotubes. TECHNOLOGY FOCUS:

ORGANIC CHEMISTRY - Preferred Component: The acid medium comprises superacid, persulfate species

and oxoacid chosen from sulfuric acid

, ortho phosphoric acid, hypochlorate

and/or nitric acid, preferably sulfuric

acid. The dispersed carbon nanotubes

are functionalized using diazonium salt as

diazonium species, and functionalizing agent chosen from

carbo cation, halonium ion, metal cation, carbon radical,

halogen radical, hetero atom radical species, metal based radical

and/or dipolarophiles. The functionalized (single wall)

carbon nanotubes have at least 1 functional group

per 100 carbon nanotubes carbons. The

superacid medium is chosen from oleum,

chlorosulfonic acid and triflic

acid. The aniline species comprises

sulfanilic acid. Preferred Process: The

diazonium species is generated in situ by reaction of an

aniline species with a nitrite species, and is

produced from a triazene precursor. The functionalization

method further involves carrying out post processing step(s) chosen

from diluting, filtering, washing and drying,

isolating the sidewall functionalized carbon

nanotubes from acidic medium by

filtration, and re-suspending the isolated

functionalized carbon nanotubes in a solvent

such as water. Single wall carbon nanotubes are

dispersed in a superacid medium, to form a dispersion.

The dispersion is filtered to remove large particles.

Aniline species and nitrite species are added to

the dispersion, to obtain a reaction mixture. The reaction mixture

is reacted by heating and stirring, to obtain functionalized single

wall carbon nanotubes. A radical source such as

2,2'-azo-bis-isobutyryl nitrile, benzoyl peroxide and/or

di-tert-butyl peroxide is added to the reaction mixture. The reaction mixture is diluted with water, and filtered over a filter, to isolate the functionalized single wall carbon nanotubes. The isolated carbon nanotubes are washed with a washing solvent such as acetone, and re-suspended in water. The obtained re-suspension is filtered, to recover re-washed functionalized single wall carbon nanotubes. The functionalized single wall carbon nanotubes are oxidatively treated, and are homogenous in characteristics such as length, diameter and/or chirality.

## EXTENSION ABSTRACT:

EXAMPLE - Purified single wall carbon nanotubes (in g) (0.05) were dispersed in oleum (50 ml) at 80degreesC, and filtered to remove large particulates. Sulfanilic acid (2.91) and sodium nitrite (1.16) were added to the dispersion. 2,2'-azo-bis-isobutyryl nitrile (as radical source) (1.38) was added to the resulting solution, and stirred at 80degreesC for 1 hour. The reaction mixture was poured into water (300 ml), filtered, and washed with acetone (500 ml). The resulting black powder product was dispersed in water, and filtered to remove soluble impurities. Thus, functionalized single wall carbon nanotube was obtained. Raman spectrum of the obtained carbon nanotube showed that functionalization had occurred.

FILE SEGMENT: CPI  
MANUAL CODE: CPI: E05-U; E05-U04

L31 ANSWER 3 OF 4 WPIX COPYRIGHT 2010 THOMSON REUTERS on STN  
ACCESSION NUMBER: 2005-182070 [200519] WPIX  
DOC. NO. CPI: C2005-058124 [200519]  
TITLE: Manufacture of carbon nanotube  
-elastomer composite, involves functionalizing  
carbon nanotubes, mixing  
functionalized carbon nanotubes  
with elastomeric precursor, and curing obtained  
mixture  
DERWENT CLASS: A60; A95; E36  
INVENTOR: HUDSON J; HUDSON J L; KRISHNAMOORTI R;  
MITCHELL C; MITCHELL C A; TOUR J; TOUR J M  
; YUREKLI K; KRISHNAMOORTI R  
PATENT ASSIGNEE: (UYHO-N) UNIV HOUSTON; (UYRW-C) UNIV RICE  
WILLIAM MARSH  
COUNTRY COUNT: 107

## PATENT INFORMATION:

PATENT NO	KIND DATE	WEEK	LA	PG	MAIN IPC
WO 2005014708	A1 20050217 (200519)*	EN	46	[9]	
EP 1644438	A1 20060412 (200626)	EN			
JP 2007524727	T 20070830 (200759)	JA	26		
US 20070259994	A1 20071108 (200774)	EN			

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2005014708 A1		WO 2004-US20108	20040623

EP 1644438 A1  
 EP 1644438 A1  
 JP 2007524727 T  
 JP 2007524727 T  
 US 20070259994 A1 Provisional  
 US 20070259994 A1  
 US 20070259994 A1

EP 2004-785957 20040623  
 WO 2004-US20108 20040623  
 WO 2004-US20108 20040623  
 JP 2006-517570 20040623  
 US 2003-480643P 20030623  
 WO 2004-US20108 20040623  
 US 2007-561712 20070607

## FILING DETAILS:

PATENT NO	KIND	PATENT NO
EP 1644438 A1	Based on	WO 2005014708 A
JP 2007524727 T	Based on	WO 2005014708 A

PRIORITY APPLN. INFO: US 2003-480643P 20030623  
 US 2007-561712 20070607

## INT. PATENT CLASSIF.:

MAIN: C08K0007-06  
 SECONDARY: C01B0031-02; C08K0009-04  
 IPC ORIGINAL: C01B0031-00 [I,C]; C01B0031-02 [I,A];  
 C08K0007-00 [I,C]; C08K0007-06 [I,A]; C08K0009-00  
 [I,C]; C08K0009-04 [I,A]; C08L0021-00 [I,A];  
 C08L0021-00 [I,C]  
 IPC RECLASSIF.: C01B0031-00 [I,C]; C01B0031-02 [I,A];  
 C08K0007-00 [I,C]; C08K0007-06 [I,A]; C08K0009-00  
 [I,C]; C08K0009-04 [I,A]

ECLA: C01B0031-02B; C08J0005-00N+L21/00  
 ICO: Y01N0006:00  
 USCLASS NCLM: 523/333.000  
 NCLS: 524/847.000; 977/742.000

## JAP. PATENT CLASSIF.:

MAIN/SEC.: C01B0031-02 101 F; C08K0009-04; C08L0021-00  
 FTERM CLASSIF.: 4G146; 4J002; 4G146/AA11; 4J002/AC00.1; 4G146/BA04;  
 4G146/CB35; 4J002/DA01.6; 4J002/FA05.6;  
 4J002/FB08.6; 4J002/FD01.6

## BASIC ABSTRACT:

WO 2005014708 A1 UPAB: 20050708

NOVELTY - Carbon nanotubes (CNT) are functionalized and mixed with an elastomeric precursor, to form a mixture. The mixture is then cured, to form a CNT-elastomer composite.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for CNT-elastomer composite comprising functionalized CNTs in an elastomeric matrix.

USE - For manufacturing CNT-elastomer composite (claimed) for rubber tires, belts, hoses, seals, O-rings, and blow-out preventors, for use in industries, such as automotive, engine, aerospace, oil drilling, and refining.

ADVANTAGE - The manufacturing method provides CNT-elastomer composites which display an enhancement in their tensile modulus (over the native elastomer) but without a large concomitant reduction in their strain-at-break. The obtained composites have improved mechanical, thermal and electrical properties, and maintain a low density.

## TECHNOLOGY FOCUS:

POLYMERS - Preferred Method: Alternately, the CNTs are surfactant-wrapped and mixed with the elastomeric precursor, or the composite is obtained by dispersing CNTs in a solvent, adding elastomeric precursor to the dispersion, removing the solvent, and curing the obtained blend. The mixing step is carried out in a solvent, which is removed by vacuum drying after mixing. Mixing is carried out in a blender for 1 second to 3 days, at 20-400degreesC. The curing step effects a cross-linking within the composite

matrix, using a curing agent or catalyst. The curing step involves thermal curing, radiative curing, and/or chemical curing. Curing is carried out at 80-200degreesC and 1-760 Torr, in an inert atmosphere. The method further involves reacting the functionalized CNTs with the elastomer so as to covalently integrate the CNTs into the elastomeric matrix.

**Preferred Precursor:** The elastomeric precursor is poly(dimethylsiloxane), polyisoprene, polybutadiene, polyisobutylene, halogenated polyisoprene, halogenated polybutadiene, halogenated polyisobutylene, low-temperature epoxy, nitrile polymers, such as polyacrylonitrile, fluoropolymers, and/or ethylene-propylene diene monomer terpolymers. The precursor comprises a functionality to enhance interaction with the CNTs.

**Preferred Properties:** The tensile modulus of the composite is 100-1000% greater than the native elastomer, and the strain-at-break is comparable to the native elastomer. The composite has a strain-at-break which is within 50% of the value of the native elastomer. The CNTs are present in the composite in an amount of 0.001-20 weight%. The CNTs are covalently bound to the elastomeric matrix through functional groups attached to their sidewalls and/or ends. The CNTs interact with the elastomeric matrix via a mechanism chosen from hydrogen bonding, van der Waals bonding, pi-pi bonding, dipolar interactions, and acid-base interactions. The composite further comprises additional component(s) chosen from colorants, anti-degradation agents, and plasticizers. The composite has a cross-linking density of 0.01-5%.

**ORGANIC CHEMISTRY - Preferred Properties:** The CNTs are functionalized on their sidewalls. The CNTs are single-wall CNTs. The amount of functionalized CNTs mixed with the elastomeric precursor is 0.01-30 weight% of the resulting composite.

**Preferred Method:** The functionalization involves a reaction between CNTs and at least one diazonium species, which is a solvent-free process. The CNTs are dispersed as individuals in an intercalating acid medium prior to reaction with the diazonium species, with the aid of a surfactant. The intercalating acid medium is oleum. The solvent is removed by filtration, precipitation and/or evaporation.

**Preferred Solvent:** The solvent is o-dichlorobenzene, N,N-dimethyl formamide, and/or tetrahydrofuran.

#### EXTENSION ABSTRACT:

**EXAMPLE -** Cross-linked elastomers comprising functionalized single-walled nanotubes were prepared using amine terminated poly(dimethylsiloxane) with weight average molecular weight of 5000 daltons. Cross-link densities, estimated on the basis of swelling data in toluene, indicated that the polymer underwent cross-linking at the ends of the chains. This cross-linking was thermally initiated and found to occur only in the presence of the aryl alcohol functionalized single-walled nanotubes. Tensile properties examined at room temperature indicated 3-fold increase in the tensile modulus of the elastomer, with rupture and failure of the elastomer occurring at a strain of 6.5.

FILE SEGMENT: CPI  
MANUAL CODE: CPI: A08-C; A08-D; A08-R03; A11-C02A; A12-S08C;  
E05-U02; N07-K

L31 ANSWER 4 OF 4 WPIX COPYRIGHT 2010 THOMSON REUTERS on STN  
ACCESSION NUMBER: 2004-156509 [200415] WPIX  
TITLE: Method for functionalizing carbon  
nanotubes for molecular electronic

applications and sensor devices, involves selecting carbon nanotubes and reacting carbon nanotubes with organic functionalizing agent in absence of solvent

DERWENT CLASS:

A60; E36; F01; J04; L03; U11; U12; V04

INVENTOR:

DYKE C A; TOUR J M

PATENT ASSIGNEE:

(TOUR-I) TOUR J M; (UYRW-C) UNIV RICE WILLIAM MARSH

COUNTRY COUNT:

103

## PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
WO 2004007364	A1	20040122	(200415)*	EN	30[9]	
AU 2003253923	A1	20040202	(200450)	EN		
US 20050255030	A1	20051117	(200576)	EN		
US 7459137	B2	20081202	(200882)	EN		

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2004007364	A1	WO 2003-US22072	20030715
US 20050255030	A1 Provisional	US 2002-396371P	20020716
US 20050255030	A1 Provisional	US 2002-396373P	20020716
AU 2003253923	A1	AU 2003-253923	20030715
US 20050255030	A1	US 2005-521903	20050114
US 7459137	B2 Provisional	US 2002-396371P	20020716
US 7459137	B2 Provisional	US 2002-396373P	20020716
US 20050255030	A1 PCT Application	WO 2003-US22072	20030715
US 7459137	B2 PCT Application	WO 2003-US22072	20030715
US 7459137	B2	US 2005-521903	20050114

## FILING DETAILS:

PATENT NO	KIND	PATENT NO
AU 2003253923	A1 Based on	WO 2004007364 A
US 7459137	B2 Based on	WO 2004007364 A

PRIORITY APPLN. INFO: US 2002-396373P 20020716  
 US 2002-396371P 20020716  
 US 2005-521903 20050114

## INT. PATENT CLASSIF.:

IPC ORIGINAL: B82B0003-00 [I,A]; B82B0003-00 [I,C]; C01B0031-00 [I,C]; C01B0031-02 [I,A]; D01F0011-00 [I,C]; D01F0011-14 [I,A]; D01F0009-12 [I,A]; D01F0009-12 [I,C]

IPC RECLASSIF.: C01B0031-00 [I,C]; C01B0031-02 [I,A]; D01F0011-00 [I,C]; D01F0011-14 [I,A]; D01F0009-12 [I,A]; D01F0009-12 [I,C]

ECLA: C01B0031-02B; D01F0009-12; D01F0011-14

ICO: Y01N0004:00; Y01N0006:00

USCLASS NCLM: 423/447.100

NCLS: 423/447.400; 423/460.000; 977/840.000; 977/842.000;  
 977/847.000; 977/895.000; 977/896.000

## BASIC ABSTRACT:

WO 2004007364 A1 UPAB: 20060203

NOVELTY - Method of functionalizing carbon nanotubes involves selecting carbon nanotubes and reacting carbon nanotubes with an organic functionalizing agent in absence of a solvent.

USE - For functionalizing carbon nanotubes such as single-wall and multi-wall carbon nanotubes, used for polymer blends and composites, molecular electronic applications and sensor devices.

ADVANTAGE - The carbon nanotubes can be effectively functionalized under solvent-free conditions. The functionalizing method of carbon nanotubes, allows the chemical attachment of variety of organic compounds to side walls and ends of carbon nanotubes.

DESCRIPTION OF DRAWINGS - The figure shows the schematic diagram of process of functionalization of carbon nanotubes without solvent.

#### TECHNOLOGY FOCUS:

ORGANIC CHEMISTRY - Preferred Agent: The organic functionalizing agent is chosen from diazonium compounds, aryl radicals, alkyl radicals, aryl carbocations, aryl carbanions, alkyl carbanions, alkyl carbocations, 1,3-dipoles, heteroatom-containing radicals, heteroatom-containing cations, heteroatom-containing anions, benzyne, dienes, dienophiles, organozincates, carbenes, Grignard reagents, Gillman reagents and/or organolithium reagents, preferably reactive diazonium compounds generated from an aryl diazonium salt.

Preferred Method: The carbon nanotubes are functionalized between one functional group per 1000 carbon atoms of the carbon nanotubes, and one functional group per 5 carbon atoms of the carbon nanotubes.

Preferred Carbon Nanotubes: The carbon nanotubes are chosen from single-wall carbon nanotubes and/or multi-wall carbon nanotubes, preferably single-wall carbon nanotubes.

Preferred Property: The carbon nanotubes have diameter of 0.7-2 nm.

Preferred Conditions: Reaction of carbon nanotubes with the organic functionalizing agent, is performed at a temperature of 22-100degreesC for 1 minute to 4 hours, preferably 1 minute to 1 hour. The reaction is performed under an inert atmosphere, and further involves adding a polymer to effect an in-situ blending, and mixing the carbon nanotubes and the organic functionalizing agent by mechanical operation. The mechanical operation is chosen from ball milling, stirring, shaking, high shear mixing and/or twin-screw mixing. Mixing is performed with an intensity of 100-1500 RPM.

Preferred Compound: The aryl diazonium salt is chosen from o-substituted aryl diazonium salts, m-substituted aryl diazonium salts and/or p-substituted aryl diazonium salts. The diazonium salt is preferably of formula (Ia).

R = halogen, nitro, cyano, alkyl, aryl, arylalkyl, hydroxy, carboxylic ester, carboxylic acid, thiocarbonate, amide, alkoxy, polyether, polyalkyl and/or hydroxyalkyl.

The aryl diazonium salt is preferably chosen from di-, tri-, tetra- and/or penta-substituted aryl diazonium salts. The diazonium compound is produced in-situ from an aniline derivative and an alkyl nitrite compound, or from aniline derivative and an inorganic nitrite such as sodium nitrite in presence of an acid.



Preferred Acid: The acid is chosen from sulfuric acid, acetic acid, hydrochloric acid, nitric acid, phosphoric acid, toluene sulfonic acid and/or trifluoroacetic acid.

Preferred Derivative: The aniline derivative is chosen from o-, m- and/or p-substituted aniline, preferably di-, tri-, tetra- and/or penta-substituted aniline. The aniline derivative is of formula (IIa).

R = as defined in formula (Ia).

#### EXTENSION ABSTRACT:

EXAMPLE - Purified single-walled carbon nanotubes and 4-chloroaniline, were added to a flask and purged with nitrogen. The flask was then heated to 60degreesC. After 1 hour, isoamyl nitrite was added slowly, and the reaction mixture was stirred for an additional 1 hour. Subsequently, the reaction mixture was diluted with acetonitrile so as to solubilize unreacted diazonium salt. Consequently, solid functionalized tubes were collected by filtration. Spectroscopic evidence suggested that high degree of functionalization occurred by the solvent-free technique.

FILE SEGMENT: CPI; EPI  
MANUAL CODE: CPI: A08-M; E05-U01; E05-U02; F01-D09A; J04-X; L03-J  
EPI: U11-C18C; U12-B03E; U12-B03F1A; V04-X01B

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L33 ANSWER 1 OF 18 WPIX COPYRIGHT 2010 THOMSON REUTERS on STN  
ACCESSION NUMBER: 2008-L85704 [200869] WPIX  
DOC. NO. CPI: C2008-358148 [200869]  
DOC. NO. NON-CPI: N2008-873148 [200869]  
TITLE: Conductive ink composition for preparing metal-containing film, comprises metal complex compound from reaction of metal (compound) with ammonium carbamate- or carbonate-based compound, and additive  
DERWENT CLASS: A85; E19; L03; U11; V04  
INVENTOR: CHO H; CHO N; CHUNG K; GONG M; HAN Y; KWANG-CHOON C; NAM D; PARK J; SEO Y; SEONG-YO C; UHM S; CHO H N; CHO N B; CHUNG K C; GONG M S; HAN Y S; NAM D H; PARK J B; SEO Y K; UHM S Y  
PATENT ASSIGNEE: (INKT-N) INKTEC CO LTD; (INKT-N) INKTEC CO LTD  
COUNTRY COUNT: 113

#### PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
WO 2006093398	A1	20060908	(200869)*	EN	96	[10]
CN 101010388	A	20070801	(200869)	ZH		
EP 1853671	A1	20071114	(200869)	EN		
IN 2007MN01607	A	20071102	(200869)	EN		
JP 2008531810	T	20080814	(200869)	JA	48	
KR 2006097271	A	20060914	(200869)	KO		
KR 2006101570	A	20060926	(200869)	KO		
KR 2006108875	A	20061018	(200869)	KO		
KR 2006112025	A	20061031	(200869)	KO		

KR 658492	B1	20061215	(200869)	KO
KR 667958	B1	20070111	(200869)	KO
KR 727434	B1	20070613	(200869)	KO
KR 727451	B1	20070613	(200869)	KO
US 20080206488	A1	20080828	(200869)	EN
TW 2006043126	A	20061216	(200940)	ZH
US 7691294	B2	20100406	(201024)	EN
RU 2388774	C2	20100510	(201035)	RU

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2006093398	A1	WO 2006-KR754	20060304
KR 2006097271	A	KR 2005-18364	20050304
KR 727434	B1	KR 2005-18364	20050304
KR 2006101570	A	KR 2005-23013	20050321
KR 658492	B1	KR 2005-23013	20050321
KR 2006108875	A	KR 2005-31090	20050414
KR 667958	B1	KR 2005-31090	20050414
KR 2006112025	A	KR 2005-34371	20050426
KR 727451	B1	KR 2005-34371	20050426
CN 101010388	A	CN 2006-80000687	20060304
EP 1853671	A1	EP 2006-716204	20060304
CN 101010388	A PCT Application	WO 2006-KR754	20060304
EP 1853671	A1 PCT Application	WO 2006-KR754	20060304
IN 2007MN01607	A PCT Application	WO 2006-KR754	20060304
JP 2008531810	T PCT Application	WO 2006-KR754	20060304
US 20080206488	A1 PCT Application	WO 2006-KR754	20060304
US 7691294	B2 PCT Application	WO 2006-KR754	20060304
TW 2006043126	A	TW 2006-109413	20060320
JP 2008531810	T	JP 2007-557939	20060304
US 20080206488	A1	US 2007-817374	20070829
US 7691294	B2	US 2007-817374	20070829
IN 2007MN01607	A	IN 2007-MN1607	20071003
RU 2388774	C2 PCT Application	WO 2006-KR754	20060304
RU 2388774	C2	RU 2007-136798	20060304

## FILING DETAILS:

PATENT NO	KIND	PATENT NO
KR 727434	B1	Previous Publ
KR 658492	B1	Previous Publ
KR 667958	B1	Previous Publ
KR 727451	B1	Previous Publ
CN 101010388	A	Based on
EP 1853671	A1	Based on
JP 2008531810	T	Based on
US 7691294	B2	Based on
RU 2388774	C2	Based on

PRIORITY APPLN. INFO:	KR 2005-34371	20050426
	KR 2005-18364	20050304
	KR 2005-23013	20050321
	KR 2005-31090	20050414

## INT. PATENT CLASSIF.:

MAIN:	C09D0005-24
SECONDARY:	C09D0011-00
IPC ORIGINAL:	B05D0003-02 [I,A]; B05D0003-02 [I,C]; C08K0005-00

[I,C]; C08K0005-098 [I,A]; C08K0005-205 [I,A];  
 C09D0011-00 [I,C]; C09D0011-00 [I,A]; C09D0011-00  
 [I,C]; C09D0011-00 [I,A]; C09D0011-00 [I,C];  
 C09D0005-24 [I,C]; C09D0005-24 [I,A]; C09D0005-24  
 [I,C]; C09D0007-12 [I,A]; C09D0007-12 [I,C];  
 C23C0014-28 [I,A]; C23C0014-28 [I,C]; C23C0014-30  
 [I,A]; H01B0001-00 [I,A]; H01B0001-00 [I,C];  
 H01B0001-20 [I,A]; H01B0001-20 [I,C]; H01B0001-22  
 [I,A]; H01B0001-22 [I,C]; H01B0013-00 [I,A];  
 H01B0013-00 [I,C]; H01L0021-02 [I,C]; H01L0021-288  
 [I,A]; C08K0003-00 [I,C]; C08K0003-10 [I,A]  
 C09D0005-24; C09D0011-00C; C09D0011-00D  
 ECLA:  
 USCLASS NCLM:  
 NCLS: 427/596.000  
 106/031.920; 252/513.000; 252/514.000; 252/515.000;  
 427/384.000; 427/595.000

JAP. PATENT CLASSIF.:  
 MAIN/SEC.: C09D0011-00; H01B0001-20 Z; H01B0013-00 503 C;  
 H01L0021-288 Z  
 FTERM CLASSIF.:  
 4J039; 4M104; 5G301; 5G323; 4J039/AD07; 4J039/BA04;  
 4J039/BA06; 4M104/BB02; 4M104/BB04; 4M104/BB05;  
 4M104/BB06; 4M104/BB07; 4M104/BB08; 4M104/BB09;  
 4M104/BB13; 4M104/BB14; 4M104/BB16; 4M104/BB17;  
 4M104/BB18; 4M104/BB36; 4J039/BC59; 4J039/CA07;  
 5G301/DA03; 5G301/DA04; 5G301/DA05; 5G301/DA06;  
 5G301/DA07; 5G301/DA08; 5G301/DA09; 5G301/DA10;  
 5G301/DA11; 5G301/DA12; 5G301/DA13; 5G301/DA14;  
 5G301/DA15; 5G301/DA22; 5G301/DA42; 5G301/DD02;  
 4M104/DD51; 4M104/DD78; 4J039/EA24; 4J039/GA02;  
 4J039/GA10; 4J039/GA24

## BASIC ABSTRACT:

WO 2006093398 A1 UPAB: 20090629

NOVELTY - A conductive ink composition comprises metal complex compound. The metal complex compound is obtained by reacting metal and/or metal compound with ammonium carbamate- or ammonium carbonate-based compound, and an additive.

DETAILED DESCRIPTION - A conductive ink composition comprises metal complex compound. The metal complex compound is obtained by reacting metal and/or metal compound of structure MnX with ammonium carbamate- or ammonium carbonate-based compound of structure R1-N(R2)C(O)NH(R3R5)-R4, R2-NH(R1R3)OC(O)NH(R4R6)-R5, or R2-NH(R1R3)OC(O)OH, and an additive.

M=metal (alloy);

n=1-10;

R1-R6=H, optionally substituted 1-30C aliphatic alkyl, cycloaliphatic alkyl, aryl or aralkyl; polymer compound; heterocyclic compound; and their derivatives; R1-R5 may be connected with each other to form an alkylene ring optionally with heteroatom; and

X=nonexistent or substituent(s), i.e. H, NH4, O, S, halo, CN, cyanate, carbonate, nitrate, nitrite, SO4, PO4, SCN, ClO4, perchlorate, tetrafluoroborate, acetylacetonate, SH, amide, alkoxide, carboxylate or their derivatives.

Preferred Definitions are included in Definitions Field. An INDEPENDENT CLAIM is also included for preparing a metal-containing film comprising coating the conductive ink composition, and treating the same by oxidation, reduction, heat treatment, infrared (IR) treatment, UV treatment, electron beam treatment or laser treatment.

USE - The composition is useful for preparing metal-containing film (claimed) used in making, e.g. printed circuit board, metal writings, antennas for radio frequency, and electronic circuits.

ADVANTAGE - The invention provides composition with very superior stability and solubility, enabling easy formation of thin film. It is easily

calcined even at low temperature, thus enabling formation of uniform and precise film or pattern with good conductivity regardless of the particular substrate used. It enables easy control of metal content and film thickness.

DESCRIPTION OF DRAWINGS - The figure shows TGA for metal link

composition.

TECHNOLOGY FOCUS:

IMAGING AND COMMUNICATION - Preferred Methods: The ink composition is prepared by heating, cooling, electrolysis, ultrasonification, micro wave treatment, high-frequency treatment, plasma treatment, IR treatment, or UV treatment. The ink composition is prepared by adding nitrogen dioxide, sulfur dioxide, carbon dioxide, boric acid and boron acid along with carbon dioxide to an amine compound in the preparation of ammonium carbamate- or ammonium carbonate-based compound. The film is formed by coating on a substrate. The substrate is pre-treated before use. The pre-treatment is plasma treatment, ion beam treatment, corona treatment, oxidation or reduction, heating, etching, UV treatment, or primer treatment performed in air, nitrogen, argon, carbon monoxide, and/or hydrogen at 80-300, preferably 80-150 degrees C for 1-30 minutes, and then at 150-300 degrees C for 1-30 minutes. The coating is performed by spin coating, roll coating, spray coating, dip coating, flow coating, doctor blade coating, dispensing, ink-jet printing, offset printing, screen printing, pad printing, gravure printing, flexography, stencil printing, imprinting, and xerography

INORGANIC CHEMISTRY - Preferred Components: The metal compound in I is silver, gold (Au) (chloride), copper (Cu) (oxide), zinc (Zn) (oxide), nickel (Ni) (sulfide), cobalt (Co), palladium (Pd) (chloride), platinum (Pt) (oxalate), titanium (Ti), vanadium (V) (oxide), manganese (Mn) (oxalate), iron (Fe) (chloride), chromium (Cr), zirconium (Zr), niobium (Nb), molybdenum (Mo), tungsten (W), ruthenium (Ru), cadmium (Cd), tantalum (Ta), rhenium (Re), osmium (Os), iridium (Ir), aluminum (Al), gallium (Ga), germanium (Ge), thulium, tin (Sn), antimony (Sb), lead (Pb), bismuth (Bi) (nitrate), silicon (Si), samarium (Sm), europium (Eu), calcium (Ca), strontium (Sr), barium (Ba), actinium, astatine (As), mercury (Hg), thorium (Th), copper carbonate, magnesium (Mg), nickel chloride, cobalt chloride, vanadium acetylacetonate, cobalt acetate, tin lactate, gold acetate, copper 2-ethylhexanoate, gold acetate, palladium oxalate, copper 2-ethylhexanoate, iron stearate, nickel formate, ammonium molybdate, zinc citrate, bismuth acetate, copper cyanide, cobalt carbonate, platinum chloride, hydrogen chloroaurate, tetrabutoxy titanium, dimethoxy zirconium dichloride, aluminum isopropoxide, tin tetrafluoroborate, tantalum methoxide, dodecylmercapto aurate, or indium acetylacetonate. The silver compound is silver oxide, silver thiocyanate, silver cyanide, silver cyanate, silver carbonate, silver nitrate, silver nitrite, silver sulfate, silver phosphate, silver perchlorate, silver tetrafluoroborate, silver acetylacetonate, silver acetate, silver lactate, silver oxalate, or their derivatives. The silver alloy is an alloy containing Au, Cu, Ni, Co, Pd, Pt, Ti, V, Mn, Fe, Cr, Zr, Nb, Mo, W, Ru, Cd, Ta, Re, Os, Ir, Al, Ga, Ge, In, Sn, Sb, Pb, Bi, Si, As, Hg, Sm, Eu, Th, Mg, Ca, Sr and Ba. The ammonium carbamate-based compound is ammonium carbamate, ethylammonium ethylcarbamate, isopropyl ammonium isopropylcarbamate, n-butylammonium n-butylcarbamate, isobutyl ammonium isobutyl carbamate, t-butylammonium t-butylcarbamate, 2-ethylhexylammonium 2-ethylhexylcarbamate, octadecylammonium octadecyl carbamate, 2-methoxyethylammonium 2-methoxyethylcarbamate, 2-cyanoethylammonium

2-cyanoethylcarbamate, di butylammonium dibutylcarbamate, di octadecylammonium dioctadecyl carbamate, methy decylammonium methyldecyl carbamate, hexamethylene iminium hexamethyleneimine carbamate, morpholinium morpholine carbamate, pyridinium ethylhexyl carbamate, triethylene di aminium isopropylcarbamate, benzylammonium benzylcarbamate, or triethoxysilyl propylammonium triethoxysilyl propylcarbamate. The ammonium carbonate-based compound is ammonium carbonate, ethylammonium ethylcarbamate, isopropyl ammonium isopropyl carbonate, n-butylammonium n-butylcarbonate, isobutyl ammonium isobutyl carbonate, t-butylammonium t-butylcarbonate, 2-ethylhexylammonium 2-ethylhexylcarbonate, 2-methoxyethylammonium 2-methoxyethylcarbonate, 2-cyanoethylammonium 2-cyanoethylcarbonate, octadecylammonium octadecyl carbonate, di butylammonium di butylcarbonate, di octadecylammonium dioctadecyl carbonate, methy decylammonium methyldecyl carbonate, hexamethylene iminium ammonium hexamethylene imine carbonate, morpholinium morpholine carbonate, benzyl ammonium benzyl carbonate, triethoxysilyl propyl ammonium triethoxysilyl propyl carbonate, triethylene di aminium isopropyl carbonate, ammonium bicarbonate, isopropyl ammonium bicarbonate, t-butyl ammonium bicarbonate, 2-ethylhexyl ammonium bicarbonate, 2-methoxyethyl ammonium bicarbonate, 2-cyanoethyl ammonium bicarbonate, di octadecyl ammonium bicarbonate, pyridinium bicarbonate, triethylene di aminium bicarbonate, or their derivatives. The additive is a conductor, a metal precursor, an oxidant, a stabilizer, a solvent, a dispersing agent, a binder resin, a reductant, a surfactant, a wetting agent, a thixotropic agent, or a leveling agent. The conductor is Ag, Au, Cu, Zn, Ni, Co, Pd, Pt, Ti, V, Mn, Fe, Cr, Zr, Nb, Mo, W, Ru, Cd, Ta, Re, Os, Ir, Al, Ga, Ge, In, Sn, Sb, Pb, Bi, Sm, Eu, Ac and Th, an alloy or their alloy oxide, conductive carbon black, graphite, carbon nanotube, or conductive polymer. The ink composition comprises (weight % per 100 weight % of ink composition) conductor, metal precursor or their mixture comprises (1-90). The conductor or the metal precursor is in the form particle, powder, flake, colloid, hybrid, paste, sol, and/or solution. The conductor or the metal precursor has a spherical, linear and/or planar shape. The oxidant is an oxidative gas, peroxide, a peroxyacid, an oxidative inorganic acid, an oxidative metal compound, or an oxidative nonmetal compound. The oxidant is air, oxygen, ozone, hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>), sodium oxide (Na<sub>2</sub>O<sub>2</sub>), potassium dioxide (K<sub>2</sub>O<sub>2</sub>), sodium borate (NaBO<sub>3</sub>), potassium sulfoxide (K<sub>2</sub>S<sub>2</sub>O<sub>8</sub>), ammonium sulfoxide (NH<sub>4</sub>)<sub>2</sub>S<sub>2</sub>O<sub>8</sub>, sodium sulfoxide (Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub>), hydrogen sulfite, potassium hydro sulfate, trimethyl carboxylic acid, peroxyacetic acid, phenyl peroxy acid, m-chloro phenyl peroxy acid, nitric acid, sulfuric acid, iodide, ferrous chloride, ferric nitrate, ferric sulfate, potassium ferric cyanide, ammonium ferric sulfate, ammonium ferrous sulfate hexahydrate, sodium periodate, cesium ammonium sulfate, sodium periodate, potassium manganate, or potassium chromate. The stabilizer is an amine compound, an ammonium compound, a phosphorus compound, and/or sulfur compound. The amine compound is prim-, sec-, or tert-amine. The amine compound is methylamine, ethylamine, (iso)propylamine, (iso)butylamine, isoamylamine, n-hexylamine, 2-ethylhexylamine, n-heptylamine, (iso)octylamine, nonylamine, decylamine, dodecylamine, hexadecylamine, octadecylamine, docododecylamine, cyclopropylamine, cyclopentylamine, cyclohexylamine, allylamine, hydroxy amine, ammonium hydroxide, methoxyamine, 2-ethanolamine, methoxyethylamine,

2-hydroxypropylamine, methoxy propylamine, cyano ethylamine, ethoxy amine, n-butoxy amine, 2-hexyloxyamine, methoxy ethoxyethylamine, methoxyethoxy ethoxyethylamine, diethylamine, dipropylamine, diethanolamine, hexamethyleneimine, morpholine, piperidine, piperazine, ethylenediamine, propylenediamine, hexamethylenediamine, triethylenediamine, 2,2-(ethylenedioxy)bis ethylamine, triethylamine, triethanolamine, Pyrrole, imidazole, pyridine, aminoacetaldehyde dimethyl acetal, 3-aminopropyltrimethoxysilane, 3-aminopropyltriethoxysilane, aniline, anisidine, aminobenzonitrile, benzylamine, polyallylamine, polyethyleneimine, or their derivatives. The phosphorus compound is phosphine or phosphate. The binder is acryl resin, cellulose resin, polyester resin, polyamide resin, polyether resin, vinyl resin, polyurethane resin, urea resin, alkyd resin, silicone resin, fluorine resin, olefin resin, petroleum resin, rosin resin, epoxy resin, unsaturated polyester resin, vinyl polyester resin, diallyl phthalate resin, phenol resin, oxetane resin, oxazine resin, bismaleimide resin, modified silicone resin, melamine resin, acryl resin, rubber, natural polymer, glass resin, or glass frit. The reductant is reductive amine compound, metal salt, or organic compound. The reductive amine compound is hydrazine, acetic hydrazide, sodium or potassium borohydride, trisodium citrate, methy diethanol amine, or dimethylamine borane. The organic compound is hydrogen (iodide), carbon monoxide, aldehyde, e.g. formaldehyde or acetaldehyde, glucose, ascorbic acid, salicylic acid, tannic acid, pyrogallol, or hydroquinone.

**METALLURGY** - Preferred Components: The metal complex compound can also have structure MAm.

A = compound of structure R1-N(R2)C(O)ONH(R3R5)-R4, R2-NH(R1R3)OC(O)NH(R4R6)-R5, or R2-NH(R1R3)OC(O)OH; and m = greater than or equal to 0.7- less than or equal to 5.5

**ORGANIC CHEMISTRY** - Preferred Components: The solvent is water, alcohol, glycol, acetate, ether, ketone, an aromatic solvent, or halogenated hydrocarbon. The alcohol is methanol, ethanol, isopropanol, 1-methoxypropanol, butanol, ethylhexyl alcohol, or terpeneol. The solvent can also be ethylene glycol, glycerines, ethyl acetate, butyl acetate, methoxypropyl acetate, carbital acetate, ethylcarbital acetate, methylcellulose, butylcellulose, diethyl ether, tetrahydrofuran, dioxane, methyl ethyl ketone, acetone, dimethylformamide, 1-methyl-2-pyrrolidone, hexane, heptane, dodecane, paraffin oil, mineral spirit, benzene, toluene, xylene, chloroform, methylene chloride, carbon tetrachloride, acetonitrile, or dimethylsulfoxide. The substrate is metal, glass, silicon wafer, ceramic, polyester, polyimide, rubber sheet, fiber, wood, or paper.

#### EXTENSION ABSTRACT:

**DEFINITIONS** - Preferred Definitions: - M=silver (compound); - R1-R6=H, Me, Et, (iso)propyl, (iso)butyl, amyl, (ethyl)hexyl, heptyl, (iso)octyl, nonyl, decyl, dodecyl, hexadecyl, octadecyl, docodecyl, cyclopropyl, cyclopentyl, cyclohexyl, allyl, OH, OMe, OMeEt, methoxypropyl, CNet, ethoxy, butoxy, hexyloxy, methoxyethoxyethyl, ethoxyethoxyethoxyethyl, hexamethyleneimine, morpholine, piperidine, piperazine, ethylenediamine, propylenediamine, hexamethylenediamine, triethylenediamine, pyrrole, imidazole, pyridine, carboxymethyl, tri-methoxysilylpropyl, triethoxysilylpropyl, Ph, OMePh, CNPh, phenoxy, tolyl, benzyl, polyallylamine, or polyethyleneamine; - n=1-4; and - X=S, halo, CN, cyanate, CO3, nitrate, nitrite, SO4, PO4, SCN, ClO4, perchlorate, tetrafluoroborate,

acetylacetone, carboxylate, or their derivatives

EXAMPLE - 2-Ethylhexyl ammonium 2-ethylhexylcarbamate (9.52 g) was dissolved in a mixture solution containing (ml) methanol (10) and aqueous solution (30) in flask with stirrer. Copper powder (1g) was added and reaction was performed at room temperature for 30 minutes under oxygen bubbling. As the reaction proceeded, the reaction mixture turned into a dark brown slurry and then into blue transparent solution. The solvent was removed from the reaction solution in vacuum to blue copper complex compound (7.15g). Thermogravimetric analysis (TGA) confirmed that the copper content was 11.28 weight %. Copper complex compound (3g) was added with copper flake (5g), polyvinylbutyral (0.2g) dissolved in butyl carbitol (1.8 g). After 10 minutes of stirring, the mixture was passed through a three-roll mill for 5 times to obtain a conductive ink composition having a viscosity of 72600 centipoises. Thermogravimetric analysis confirmed that the metal content was 53.33 weight %. The ink composition was coated on polyethylene terephthalate (PET) film under nitrogen atmosphere using a silk-screen printer patterned to 325 meshes to obtain a uniform and precise film. The film was calcined at 150 degrees C to obtain the pattern having conductivity of 0.472 ohm /square, and good adherence.

FILE SEGMENT:

CPI; EPI

MANUAL CODE:

CPI: A10-E21; A10-E22; A11-B05; A12-E01; E05-D;  
E05-E; E05-F; E05-J; E05-L; E05-M; E05-N; E05-P;  
E05-Q; E07-D; E10-B01; E10-B03B2; E10-B04;  
E10-D01D; E31-D02; E31-E; E31-K07; E31-M; E31-Q;  
E35-U; L03-A01A3  
EPI: U11-A08B1; V04-R02P; V04-R02S; V04-R03

L33 ANSWER 2 OF 18 WPIX COPYRIGHT 2010 THOMSON REUTERS on STN  
ACCESSION NUMBER: 2008-L68468 [200868] WPIX  
CROSS REFERENCE: 2006-567343  
DOC. NO. CPI: C2008-350722 [200868]  
DOC. NO. NON-CPI: N2008-859856 [200868]  
TITLE: Forming guanidine group on carbon nanotubes, involves forming a carboxyl group on carbon nanotubes; and forming a guanidine group on the carboxyl group of the carbon nanotubes  
DERWENT CLASS: A97; E16; E36; L03; M11; P42; X25  
INVENTOR: LEE H S  
PATENT ASSIGNEE: (SMSU-C) SAMSUNG ELECTRO-MECHANICS CO  
COUNTRY COUNT: 1

PATENT INFORMATION:

PATENT NO	KIND DATE	WEEK	LA	PG	MAIN IPC
US 20080193656	A1	20080814	(200868)*	EN	17[5]

APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 20080193656	A1 Div Ex	US 2005-126375	
20050511			
US 20080193656	A1	US 2007-822468	20070706

FILING DETAILS:

PATENT NO	KIND	PATENT NO
US 20080193656 A1	Div ex	US 7261924 B

PRIORITY APPLN. INFO: KR 2005-7585

20050127

INT. PATENT CLASSIF.:

IPC ORIGINAL: B05D0003-02 [I,A]; B05D0003-02 [I,C]; C07C0277-00 [I,C]; C07C0277-08 [I,A]; C07C0279-00 [I,C]; C07C0279-14 [I,A]; C25D0009-00 [I,C]; C25D0009-06 [I,A]

ECLA: D01F0011-12; D01F0011-14

ICO: Y01N0006:00

USCLASS NCLM: 427/385.500

NCLS: 205/316.000; 564/188.000; 977/742.000

BASIC ABSTRACT:

US 20080193656 A1 UPAB: 20081024

NOVELTY - Forming (P1) a guanidine group on carbon nanotubes, involves forming a carboxyl group on carbon nanotubes; and forming a guanidine group on the carboxyl group of the carbon nanotubes.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for following:

- (1) a carbon nanotube comprising at least one bonded moieties of formula -C(O)-NH-C(=NH)(NH<sub>2</sub>) (I);
- (2) attaching (P2) carbon nanotubes having guanidine groups to substrate, involving coating a substrate with a polymer having crown ether attached to it; drying the polymer layer having crown ether attached it formed on the substrate to be semi-dried; and coating the semi-dried polymer layer with a solution including carbon nanotubes having guanidine groups dispersed it; or manufacturing a polymer having crown ether attached to it into a semi-dried film; and coating the semi-dried film with a solution including carbon nanotubes having guanidine groups dispersed it; or dipping an anodized aluminum oxide substrate, which is installed as a cathode, into a solution including carbon nanotubes having guanidine groups dispersed in it; and performing electrophoresis or electroplating; and
- (3) a substrate having carbon nanotubes attached to it, involves substrate; a polymer layer having crown ether attached to it; and a coating layer of carbon nanotubes having at least one bonded moiety (I) or polymer layer formed by reacting a polymer having crown ether attached to it with carbon nanotubes having at least one bonded moiety (I).

USE - For forming guanidine group on carbon nanotubes (claimed).

ADVANTAGE - The method provides guanidine group on carbon nanotubes to improve or the dispersibility of carbon nanotubes.

TECHNOLOGY FOCUS:

ORGANIC CHEMISTRY - Preferred Process: The forming of the carboxyl group is performed by adding the carbon nanotubes to a mixture of nitric acid and sulfuric acid mixed at a volume ratio of 3:1, and then reacting the carbon nanotubes and the mixture of nitric acid and sulfuric acid mixed for 22-26 hours with sonification at 50-60 degrees C. The forming of the guanidine group is performed by adding the carbon nanotubes having the carboxyl group, a compound having a guanidine group, and a coupling agent to a solvent, and then reacting the carbon nanotubes, the compound having the guanidine group, and the coupling agent, at 25-50 degrees C for 6-10 hours in an inert atmosphere. The polymer having crown ether attached it is formed by dispersing crown ether (10-20 parts by weight (pbw)) in a solvent, and then stirring the crown ether and the polymer at room temperature for 2-5 hours. The coating performed to thickness of 200-1000 mu m. The



electrophoresis or electroplating is performed using direct current of 20-50 V for 10-20 minutes. A substrate (P3) having carbon nanotubes attached to it involves an anodized aluminum oxide substrate; and carbon nanotubes having at least one bonded moiety (I) inserted into pores of the substrate. Preferred Components: The compound having the guanidine group is selected from guanidine, cyanoguanidine, and guanidine thiocyanide. The coupling agent (0.4-0.5 equivalents) is selected from 1-(3-dimethylaminopropyl)-3-ethyl-carboimide hydrochloride (EDC), dicyclohexylcarbodiimide (DCC), oxalic acid, and oxalic acid chloride. The solvent is pyridine or pyrrolidine. The crown ether selected from 1,4,7,10,13,16 hexaoxa-cyclooctadecane, 6,7,9,10,17,18,20,21-octahydro-5,8,11,16,19,22-hexaoxa-dibenzo(a,j)cyclooctadecene, and 2,5,8,11,18,21,24,27-octaoxa-tricyclo(26.4.0.0)asterisk12,17asteriskdotriaconta-1(32),12(17),13,15,28,30-hexaene.

POLYMERS - Preferred Components: The polymer is selected from polyacetylenes, polyphenylenes, polyanilines, polythiophenes, polypyrroles, mixtures of poly(3,4-ethylenedioxythiophenes) and poly(styrenesulfonic acids) (PEDOT:PSS), poly(4-vinylphenols), polymethylmethacrylates, and polystyrenes, and their derivatives. The film has thickness of 1-2 mm. The polymer layer is a coating layer or a film layer.

## EXTENSION ABSTRACT:

EXAMPLE - No suitable example given.

## FILE SEGMENT:

CPI; GMPI; EPI

## MANUAL CODE:

CPI: A12-W14; E05-U04; E11-E; E11-F07;  
E11-P; L03-A02B; L03-A02G; L03-J; M11-F  
EPI: X25-K05; X25-R04; X25-R05

L33 ANSWER 3 OF 18 WPIX COPYRIGHT 2010 THOMSON REUTERS on STN  
ACCESSION NUMBER: 2008-G68280 [200842] WPIX  
TITLE: Forming multi-walled carbon  
nanotube structures on metal aerosol  
particulate substrates, comprises combining metal  
composite particles with hydrocarbon compound in  
heated environment to form nanotube structures on  
surfaces of particles  
DERWENT CLASS: E36; L03; U12  
INVENTOR: KIM S H; ZACHARIAH M R  
PATENT ASSIGNEE: (UMBA-C) UNIV MARYLAND BALTIMORE  
COUNTRY COUNT: 114

## PATENT INFORMATION:

PATENT NO	KIND DATE	WEEK	LA	PG	MAIN IPC
WO 2008054349	A2 20080508 (200842)*	EN	23	5	
WO 2008054349	A3 20081030 (200874)	EN			
US 20080280136	A1 20081113 (200877)	EN			

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2008054349 A2		WO 2006-US25591	20060630
US 20080280136 A1	Provisional	US 2005-697319P	

20050707

US 20080280136 A1 Cont of  
US 20080280136 A1WO 2006-US25591 20060630  
US 2007-962130 20071221PRIORITY APPLN. INFO: US 2005-697319P 20050707  
WO 2006-US25591 20060630  
US 2007-962130 20071221

INT. PATENT CLASSIF.:

IPC ORIGINAL:

B32B0009-00 [I,A]; B32B0009-00 [I,C]; C01B0031-00  
[I,C]; C01B0031-02 [I,A]; D01F0009-12  
[I,A]; D01F0009-12 [I,C]; H01L0051-00 [I,A];  
H01L0051-00 [I,C]

ECLA:

C01B0031-02B

ICO:

Y01N0006:00

USCLASS NCLM:

428/367.000

NCLS:

423/447.100; 423/447.200; 977/752.000

BASIC ABSTRACT:

WO 2008054349 A2 UPAB: 20080703

NOVELTY - The method for forming multi-walled carbon nanotube structures on metal aerosol particulate substrates, comprises combining metal composite particles with a hydrocarbon compound in a heated environment to form carbon nanotube structures on the surfaces of the metal composite particles, and removing the nanotube structures from the surfaces of the metal composite particles. The metal composite particles comprise a catalyst metal and a non-catalyst metal, where the catalyst metal catalyzes a decomposition of the hydrocarbon compound and the formation of carbon nanotube structures.

DETAILED DESCRIPTION - The method for forming multi-walled carbon nanotube structures on metal aerosol particulate substrates, comprises combining metal composite particles with a hydrocarbon compound in a heated environment to form carbon nanotube structures on the surfaces of the metal composite particles, and removing the nanotube structures from the surfaces of the metal composite particles. The metal composite particles comprise a catalyst metal and a non-catalyst metal, where the catalyst metal catalyzes a decomposition of the hydrocarbon compound and the formation of carbon nanotube structures. The metal composite particles are formed by spray pyrolysis of a metal salt solution having iron and aluminum salts. A size and a density of the formed carbon nanotube structures are controlled using a ratio of ferric nitrite and aluminum nitrite in a metal salt solution. The step of removing the nanotube structures from the surfaces of the composite particles comprises immersing the composite particles with carbon nanotube structures in an acidic solution. The formed nanotube structures have diameters not greater than 10 nm. INDEPENDENT CLAIMS are included for:

(1) a method of enhancing an electrical conductivity of a substance; and

(2) a carbon nanotube material.

USE - The method is useful for forming multi-walled carbon nanotube structures on metal aerosol particulate substrates, where the carbon nanotube structures are useful in the fields such as nanotechnology, electronics and structural materials.

ADVANTAGE - The method provides uniform formation of multi-walled carbon nanotube structures on metal aerosol particulate substrates in simple, safe, effective and inexpensive manner, and ensures easy release and removal of the nanotube structures from the metal composite particles.

DESCRIPTION OF DRAWINGS - The diagram shows a transmission electron microscope image of the formed carbon nanotube structures.  
TECHNOLOGY FOCUS:

INORGANIC CHEMISTRY - Preferred Components: The catalyst metal comprises iron, and the non-catalyst metal comprises aluminum. The metal salt solution comprises ferric nitrite and aluminum nitrite.

ORGANIC CHEMISTRY - Preferred Components: The hydrocarbon compound comprises acetylene. The acidic solution comprises nitric acid.

FILE SEGMENT: CPI; EPI  
MANUAL CODE: CPI: E05-U03; E11-A01; E11-G02; L03-A02B;  
L03-A02G; N01-C; N02-A01; N06-F; N07-F02; N07-F08  
EPI: U12-B03F2; U12-B03F2A

L33 ANSWER 4 OF 18 WPIX COPYRIGHT 2010 THOMSON REUTERS on STN  
ACCESSION NUMBER: 2008-G54691 [200841] WPIX  
DOC. NO. CPI: C2008-208128 [200841]  
DOC. NO. NON-CPI: N2008-514611 [200841]  
TITLE: Phase transfer method for separating  
single-walled carbon nanotubes  
by conductivity, chirality, electronic properties,  
diameter and band gap from semiconducting  
nanotubes, comprises dispersing a population of  
nanotubes in a polar solvent  
DERWENT CLASS: E36; L03; U11  
INVENTOR: ZIEGLER K J  
PATENT ASSIGNEE: (UYFL-C) UNIV FLORIDA RES FOUND INC; (ZIEG-I)  
ZIEGLER K J  
COUNTRY COUNT: 116

## PATENT INFORMATION:

PATENT NO	KIND DATE	WEEK	LA	PG	MAIN IPC
WO 2008057070	A2 20080515 (200841)*	EN	41	[7]	
WO 2008057070	A3 20080717 (200848)	EN			
US 20100166637	A1 20100701 (201043)	EN			

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2008057070 A2		WO 2006-US36033	20060915
US 20100166637 A1	Provisional	US 2005-718028P	
US 20100166637 A1	PCT Application	WO 2006-US36033	20060915
US 20100166637 A1		US 2008-66301	20080520

PRIORITY APPLN. INFO: US 2005-718028P 20050915  
US 2008-66301 20080520

## INT. PATENT CLASSIF.:

IPC ORIGINAL: B01D0011-04 [I,A]; B01D0011-04 [I,C]; B03B0005-00  
[I,C]; B03B0005-62 [I,A]; C01B [I,S]; C01B0031-00  
[I,C]; C01B0031-02 [I,A]; D01F0009-12  
[I,A]; D01F0009-12 [I,C]

ECLA: B01D0011-04T; C01B0031-02B  
ICO: S01N0021:82; Y01N0006:00  
USCLASS NCLM: 423/447.100  
NCLS: 209/208.000; 977/742.000; 977/750.000; 977/751.000;  
977/845.000

## BASIC ABSTRACT:

WO 2008057070 A2 UPAB: 20100712

NOVELTY - The phase transfer method for separating single-walled carbon nanotubes by conductivity, chirality, electronic properties, diameter and band gap from semiconducting nanotubes, comprises dispersing a population of nanotubes in a polar solvent to form a polar phase, functionalizing a sub

population of nanotubes from the dispersed nanotubes with a group, combining a non-polar solvent with the polar solvent to form a two-phase mixture, and agitating the two-phase mixture to effect the transport of the functionalized nanotubes into the non-polar phase.

**DETAILED DESCRIPTION** - The phase transfer method for separating single-walled carbon nanotubes by conductivity, chirality, electronic properties, diameter and band gap from semiconducting nanotubes, comprises dispersing a population of nanotubes in a polar solvent to form a polar phase, functionalizing a sub-population of nanotubes from the dispersed nanotubes with a group, combining a non-polar solvent with the polar solvent to form a two-phase mixture, agitating the two-phase mixture to effect the transport of the functionalized nanotubes into the non-polar phase, identifying a target sub-population of nanotubes to be selectively functionalized, and adding an ionizable moiety to the functionalized nanotubes to assist the transport. The functionalizing group is covalently or non-covalently bonded to the nanotubes. The ionizable moiety is added by reacting the sub-population of functionalized nanotubes with chlorobenzene sulfonic acid, sulfuric acid and oleum. A phase transfer agent is dissolved in the non-polar solvent to form the non-polar phase thus assisting the transport of the targeted subpopulation. The agitation is accomplished by vigorous shaking or stirring, and forms an emulsion in the non-polar phase. A compound is added to alter the stability of the emulsion during agitation. The selective functionalization is achieved using water dispersible electron withdrawing moieties such as diazonium salts. A flocculating agent is added to the non-polar phase. An **INDEPENDENT CLAIM** is included for a sensor.

**USE** - The phase transfer method is useful for separating single-walled carbon nanotubes by conductivity, chirality, electronic properties, diameter, and band gap from semiconducting nanotubes. The single-walled carbon nanotubes are useful in a sensor (all claimed).

**ADVANTAGE** - The method enables simple, effective, efficient and bulk separation of single-walled carbon nanotubes with high strength, stiffness, thermal and electrical conductivity from the semiconducting nanotubes.

**DESCRIPTION OF DRAWINGS** - The diagram shows the functionalization phase and extraction phase of the phase transfer method.

**TECHNOLOGY FOCUS:**

**ORGANIC CHEMISTRY** - Preferred Components: The phase transfer agent is tetraoctylammonium bromide. The compound is sodium dodecyl sulfate, sodium dodecyl sulfonate, sodium dihydrobis (2-methoxyethoxy) aluminate, cetyl trimethyl ammonium bromide, dodecyl trimethyl ammonium, Brij, triton and/or pluronics. The polar solvent is water. The non-polar solvent is ethyl acetate, toluene, chloroform, benzene, methylene chloride, tetrahydrofuran, diethyl ether and/or hexane. The flocculating agent is acetic acid.

<b>FILE SEGMENT:</b>	CPI; EPI
<b>MANUAL CODE:</b>	CPI: E10-A22G; E11-Q01A; E31-N03D; E31-U02; L03-A02B; L03-A02G; L03-G10; L03-J EPI: U11-A14

L33 ANSWER 5 OF 18	WPIX COPYRIGHT 2010	THOMSON REUTERS on STN
ACCESSION NUMBER:	2008-G03038 [200838]	WPIX
CROSS REFERENCE:	2005-074540	
TITLE:	Production of nanostructured material comprising carbon nanotubes useful for purification of contaminated fluids involves suspending nanotubes in carrier; inducing mixture to flow through substrate; and depositing nanotubes on substrate	
DERWENT CLASS:	A97; B07; D13; D15; D22; E35; E36; H06; J01; J04; Q68; U11	

September 20, 2010

10/593,918

29

INVENTOR: COOPER C H; CUMMINGS A G; STAROSTIN M Y  
 PATENT ASSIGNEE: (SELD-N) SELDON TECHNOLOGIES LLC; (SELD-N) SELDON TECHNOLOGIES INC  
 COUNTRY COUNT: 117

## PATENT INFORMATION:

PATENT NO	KIND DATE	WEEK	LA	PG	MAIN IPC
WO 2007149109	A2 20071227	(200838)*	EN	68[4]	
WO 2007149109	A3 20080306	(200838)	EN		
EP 1929087	A2 20080611	(200841)	EN		
KR 2008065270	A 20080711	(200904)	KO		
JP 2009506973	T 20090219	(200914)	JA	49	
CN 101351594	A 20090121	(200915)	ZH		
IN 2008CN01589	A 20081128	(200925)	EN		
MX 2008002947	A1 20080831	(200944)	ES		

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2007149109	A2	WO 2006-US34225	20060901
CN 101351594	A	CN 2006-80037405	20060901
EP 1929087	A2	EP 2006-851536	20060901
EP 1929087	A2 PCT Application	WO 2006-US34225	20060901
KR 2008065270	A PCT Application	WO 2006-US34225	20060901
JP 2009506973	T PCT Application	WO 2006-US34225	20060901
CN 101351594	A PCT Application	WO 2006-US34225	20060901
IN 2008CN01589	A PCT Application	WO 2006-US34225	20060901
JP 2009506973	T	JP 2008-529308	20060901
IN 2008CN01589	A	IN 2008-CN1589	20080331
KR 2008065270	A	KR 2008-707930	20080401
MX 2008002947	A1 PCT Application	WO 2006-US34225	20060901
MX 2008002947	A1	MX 2008-2947	20080229

## FILING DETAILS:

PATENT NO	KIND	PATENT NO
EP 1929087	A2	WO 2007149109 A
KR 2008065270	A	WO 2007149109 A
JP 2009506973	T	WO 2007149109 A
CN 101351594	A	WO 2007149109 A
MX 2008002947	A1	WO 2007149109 A

PRIORITY APPLN. INFO: US 2005-712847P 20050901

INT. PATENT CLASSIF.:

MAIN: D21H0013-50  
 IPC ORIGINAL: B82B0003-00 [I,A]; B82B0003-00 [I,C]; B82B0003-00 [I,A]; B82B0003-00 [I,C]; C01B0031-00 [I,C]; C01B0031-02 [I,A]; C09K [I,S]; D21H0013-00 [I,C]; D21H0013-00 [I,C]; D21H0013-40 [I,A]; D21H0013-40 [I,A]; D21H0013-50 [I,A]; D21H0013-50 [I,A]; D21H0015-00 [I,C]; D21H0015-00 [I,C]; D21H0015-02 [I,A]; D21H0015-02 [I,A]; D21H0013-40; D21H0013-50; D21H0015-02  
 Y01N0006:00

ECLA:

ICO:

JAP. PATENT CLASSIF.:

MAIN/SEC.: B82B0003-00; C01B0031-02 101 F

MAIN: C01B0031-02 101 F  
SECONDARY: B82B0003-00  
FTERM CLASSIF.: 3C082; 4G146; 4G146/AA11; 4G146/AB07; 4G146/AD17;  
4G146/AD19; 4G146/AD21; 4G146/AD26; 4G146/CA01;  
4G146/CA11; 4G146/CA15; 4G146/CB10; 4G146/CB16;  
4G146/CB17; 4G146/CB19; 4G146/CB22; 4G146/CB23;  
4G146/CB32; 4G146/CB35

## BASIC ABSTRACT:

WO 2007149109 A2 UPAB: 20090307

NOVELTY - Production of nanostructured material (M1) comprising carbon nanotubes involves: suspending carbon nanotubes in a carrier fluid to form a mixture; inducing the mixture to flow through a substrate that is permeable to the carrier fluid by differential pressure filtration; depositing the carbon nanotubes from the mixture on the substrate to form the nanostructured material (M1).

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for the following:

(1) continuous or semi-continuous production of the nanostructured material (M1) comprising carbon nanotubes, involving: suspending carbon nanotubes in a carrier fluid to form a mixture, inducing the mixture to flow through a moving substrate that is permeable to the carrier fluid by differential pressure filtration, depositing the carbon nanotubes from the mixture on the moving substrate to form a nanostructured material having a length greater than 1 meter; and

(2) producing nanostructured material for filtering at least one contaminated fluid, involving: suspending carbon nanotubes and glass fibers in a carrier fluid to form a mixture, inducing the mixture to flow through a substrate that is permeable to the carrier fluid and the contaminated fluid by differential pressure filtration, and depositing the carbon nanotubes from the mixture on the substrate to form a nanostructured material.

USE - For the batch manner, continuous or semi-continuous preparation of nanostructured material comprising carbon nanotubes useful for filtering contaminated fluids; such as liquid chosen from water, petroleum or its byproducts, biological fluids, foodstuffs, alcoholic beverages, and pharmaceuticals; and/or a gas chosen from air, industrial gases, and exhaust from a vehicle, smoke stack, chimney, or cigarette, where the industrial gases comprise argon, nitrogen, helium, ammonia, and/or carbon dioxide (all claimed); for removing sulfur or specific metals from hydrocarbons; for removing contaminants that are dispersed in the air; or for waste treatment.

ADVANTAGE - The nanostructured materials provide the cleaning or purification of biological fluids e.g. contaminated blood, serums or milk that may be contaminated with small organisms, such as bacteria or viruses, that can not be accomplished by conventional filtrations. The nanostructures can be cut into desired shapes or designs to form articles as per requirement.

## TECHNOLOGY FOCUS:

INORGANIC CHEMISTRY - Preferred Components: The other components are comprised of molecules containing atoms chosen from antimony, aluminum, barium, boron, bromine, calcium, carbon, cerium, chlorine, chromium, cobalt, copper, fluorine, gallium, germanium, gold, hafnium, hydrogen, indium, iodine, iridium, iron, lanthanum, lead, magnesium, manganese, molybdenum, nickel, niobium, nitrogen, osmium, oxygen, palladium, phosphorus, platinum, rhenium, rhodium, ruthenium, scandium, selenium, silicon, silver, sulfur, tantalum, tin, titanium, tungsten, vanadium, yttrium, zinc, and/or zirconium. The carrier fluid is a gas comprised of air, nitrogen, oxygen, argon, carbon dioxide, water vapor, helium, and/or neon.

ORGANIC CHEMISTRY - Preferred Process: The carrier fluid comprises components other than carbon nanotubes  
. The substrate forms a part of the nanostructured material. The process further involves removing the substrate from the

nanostructured material. The substrate is comprised of fibrous or non-fibrous materials. The fibrous or non-fibrous materials are selected from metals, polymers, ceramic, and/or natural fibers, where the materials are optionally heat and/or pressure treated prior to depositing of the carbon nanotubes.

The carrier fluid comprises at least one liquid, and/or gas. The carrier fluid is a dispersant chosen from aqueous and non-aqueous liquids. The carrier fluid is an aqueous liquid having a pH of 1-8.9. The carrier fluid further comprises at least one aqueous and/or non-aqueous solvent. The non-aqueous solvent comprises an organic or inorganic solvents, where the organic solvents are chosen from methanol, iso-propanol, ethanol, toluene, xylene, dimethylformamide, carbon tetrachloride, and/or 1,2-dichlorobenzene. The other components comprise fibers, clusters, or particulates composed of metals, polymers, ceramics, and/or natural materials. The other components have dimension of 1-100 nm. The other components are pre-assembled and attached to the carbon nanotubes, and/or to other components, prior to deposition. The carrier fluid further comprises chemical binding agents, surfactants, buffering agents, and/or poly-electrolytes. The chemical binding agents comprise polyvinyl alcohol. The carrier fluid further comprises biomaterials chosen from proteins, DNA, and/or RNA. The process further involves forming a multilayered structure formed by sequential deposition of at least one nanostructured material comprising carbon nanotubes, and at least one additional layer that may or may not be nanostructured. The process further involves: applying an acoustic field having a frequency of 10-50 kHz to obtain or maintain dispersion of the carbon nanotubes in the carrier fluid prior to depositing; applying a high-shear flow field to the carrier fluid to disperse and or mix the carbon nanotubes in the carrier fluid prior to depositing; applying an acoustic field having a frequency ranging from 10-50 kHz and a high-shear flow field, either sequentially or in combination, to obtain or maintain dispersion of the carbon nanotubes in the carrier fluid prior to depositing; and treating the nanostructured material with at least one post-deposition treatment chosen from chemical treatment, and/or irradiation. The chemical treatment involves: (a) adding a functional group, and/or (b) coating with a polymeric or metallic material. The irradiation involves exposing the nanostructured material to radiation chosen from infrared radiation, electron-beams, ion beams, x-rays, and/or photons. The process further involves finishing the nanostructured material with at least one method chosen from cutting, laminating, sealing, pressing, and/or wrapping. The nanostructured material has a tubular shape, or is a sheet having at least two dimensions greater than 1 cm (preferably greater than 10 cm, especially greater than 100 cm, particularly 100 cm to 2 meters). The method is a batch process. The inducing involves applying a vacuum to the opposite side of the substrate on which the nanostructured material is deposited. In the continuous or semi-continuous process, the nanostructured material has a length greater than 1 meter to 10000 meters; and the process further involves gathering the nanostructured material on a take-up reel. In the process for filtering contaminated fluid: the glass fibers are coated with metal-oxygen compounds chosen from metal hydroxide  $Mx(OH)_y$ , oxyhydroxides  $MxOy(OH)_z$ , oxide  $MxOy$ , oxy-, hydroxy-, oxyhydroxy salts  $MxOy(OH)_2An$ . The process is operated: in a continuous or semi-continuous manner to form a nanostructured material having a

length of 1-1000 meters; or operated in a batch manner to form a nanostructured material that is a sheet having at least one dimension of 1 cm to 1 meter; or operated in a batch manner to form a nanostructured material having a tubular shape. The contaminated fluid is: (a) a liquid chosen from water, petroleum and its byproducts, biological fluids, foodstuffs, alcoholic beverages, and pharmaceuticals; and/or (b) a gas chosen from air, industrial gases, and exhaust from a vehicle, smoke stack, chimney, or cigarette, where the industrial gases comprise argon, nitrogen, helium, ammonia, and/or carbon dioxide.

M=cation chosen from magnesium, aluminum, calcium, titanium, manganese, iron, cobalt, nickel, copper, and/or zinc;

A=anion chosen from hydride, fluoride, chloride, bromide, iodide, oxide, sulfide, nitride, sulfate, thiosulfate, sulfite, perchlorate, chlorate, chlorite, hypochlorite, carbonate, phosphate, nitrate, nitrite, iodate, bromate, hypobromite, and/or boron;

x-z and n=not defined.

#### EXTENSION ABSTRACT:

**EXAMPLE** - A flat purification article was fabricated using a flat nanomesh that was made from commercially available purified carbon nanotubes and a non-woven, fused, polypropylene fabric substrate. Functionalized carbon nanotubes (carboxylated through a nitric acid wash) (100 mg) were added to isopropanol (400 ml, neat) and sonicated until the carbon nanotubes were well dispersed (about 10 minutes). The mixture was further diluted by adding isopropanol (2 l) such that the total volume of the resulting mixture was 2.4 liters. This diluted mixture was sonicated for an additional 10 minutes. A commercially available glass nano-fiber (200 nm diameter) was homogenized for 10 minutes in neat isopropanol (500 ml). The homogenized mixture was then diluted by additional isopropanol (1 l). The mixtures of carbon nanotubes and glass nano-fibers were combined and isopropanol was added to obtain a non-uniform suspension (4 l). This solution was sonicated for 15 minutes, which caused the carbon nanotube nanomaterial to uniformly disperse. The entire dispersion was drawn through a commercially available 5 micron, non-woven, fused activated carbon fabric under a differential pressure of 1 atmosphere to deposit the carbon nanotube/treated glass fiber nanomesh. The resulting nanomesh was removed from the fabricator and allowed to dry at 50degrees C for 2 hours to obtain a flat, square nanomesh/substrate membrane. The membrane was glued, using an hot-melt adhesive, to one side of a flat housing. This half of the housing was then mated and glued to its companion to seal to obtain a flat purification article. The article was tested for purifying the water contaminated with E. Coli. The results of a chemical analysis of filtrate from an E. coli challenge test, performed on the flat nanomesh purification article demonstrated some evidence for some amount of destruction of E. coli bacteria passing through the nanomesh.

FILE SEGMENT:

MANUAL CODE:

CPI; GMPI; EPI

CPI: A10-E09B; A11-B05D; A11-C04; A12-W11A;  
A12-W14; B04-C03A; B04-E02; B04-E03; B04-N04;  
B05-A01B; B05-A02; B05-A03A; B05-A03B; B05-C06;  
B05-C07; B11-C12; D09-C01; E05-U03;  
E11-Q02B; E31-B03C; E31-B03D; E31-D02; E31-D04;  
E31-F04; E31-F05; E31-G; E31-H03; E31-J; E31-K;



E31-M; E31-N04D; E31-N05C; E31-P; E31-Q; E32-A02;  
 E34-B; E34-C; E34-D; E34-E01; E34-E02; E35-A;  
 E35-B; E35-C; E35-F; E35-G; E35-H; E35-J; E35-K;  
 E35-L; E35-N; E35-P; E35-Q; E35-S; E35-T; E35-U;  
 E35-V; E35-W; E35-X; H06-C01B; J01-H02; J04-F02  
 EPI: U11-A14

L33 ANSWER 6 OF 18 WPIX COPYRIGHT 2010 THOMSON REUTERS on STN  
 ACCESSION NUMBER: 2007-569603 [200755] WPIX  
 DOC. NO. CPI: C2007-207212 [200755]  
 DOC. NO. NON-CPI: N2007-439076 [200755]  
 TITLE: Solid acid for polymer electrolyte  
 membrane (as electrolyte membrane) useful e.g. for  
 direct methanol fuel cell, comprises spacer group  
 combined with carbon nano  
 tube, and ionically conductive functional  
 group connected to spacer group  
 DERWENT CLASS: A85; E14; L03; X16  
 INVENTOR: I J J; I J K; JEONG M S; JUNG M; KIM D; KIM T Y;  
 LEE J; MA S K; MAH S; RYU Y; YU Y K; JUNG M S; KIM  
 D Y; LEE J G; MAH S K  
 PATENT ASSIGNEE: (SMSU-C) SAMSUNG DENKAN KK; (JUNG-I) JUNG M;  
 (KIMD-I) KIM D; (LEEJ-I) LEE J; (MAHS-I) MAH S;  
 (RYUY-I) RYU Y; (SMSU-C) SAMSUNG SDI CO LTD  
 COUNTRY COUNT: 4

## PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
US 20070104993	A1	20070510	(200755)*	EN	26	[11]
JP 2007103375	A	20070419	(200755)	JA	36	
CN 1944503	A	20070411	(200757)	ZH		
KR 668357	B1	20070112	(200924)	KO		

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 20070104993	A1	US 2006-543468	20061004
JP 2007103375	A	JP 2006-273406	20061004
CN 1944503	A	CN 2006-10139996	20061008
KR 668357	B1	KR 2006-17878	20060223

PRIORITY APPLN. INFO: KR 2006-17878 20060223  
 KR 2005-94508 20051007

## INT. PATENT CLASSIF.:

## IPC ORIGINAL:

C01B0031-00 [I,C]; C01B0031-02 [I,A];  
 C08J0005-18 [I,A]; C08J0005-18 [I,C]; C08K0005-00  
 [I,C]; C08K0005-09 [I,A]; C08L0027-00 [I,C];  
 C08L0027-16 [I,A]; C08L0029-00 [I,C]; C08L0029-04  
 [I,A]; C08L0069-00 [I,A]; C08L0069-00 [I,C];  
 C08L0071-00 [I,A]; C08L0071-00 [I,C]; C08L0079-00  
 [I,C]; C08L0079-08 [I,A]; C08L0081-00 [I,C];  
 C08L0081-02 [I,A]; H01B0001-06 [I,A]; H01B0001-06  
 [I,C]; H01M0004-90 [I,C]; H01M0004-90 [I,C];  
 H01M0004-92 [I,A]; H01M0004-96 [I,A]; H01M0004-96  
 [I,C]; H01M0008-02 [I,C]; H01M0008-02 [I,A];  
 H01M0008-02 [I,C]; H01M0008-10 [I,A]; H01M0008-10  
 [I,C]; H01M0008-10 [I,A]; H01M0008-10 [I,C]

ECLA: H01B0001-12F; H01M0008-10B2; H01M0008-10E2  
ICO: T01M0004:92S2; T01M0300:00B8C  
USCLASS NCLM: 429/033.000  
NCLS: 429/044.000  
JAP. PATENT CLASSIF.:  
MAIN/SEC.: C01B0031-02 101 F; H01B0001-06 A; H01M0004-92;  
H01M0008-02 P; H01M0008-10  
FTERM CLASSIF.: 4G146; 5G301; 5H018; 5H026; 5H018/AA07; 5H026/AA08;  
4G146/AA11; 4G146/AC03; 4G146/AC19; 4G146/AC30;  
4G146/AD16; 4G146/AD21; 4G146/AD24; 4G146/AD40;  
5H018/AS03; 5H018/AS07; 4G146/BA04; 4G146/BC47;  
5G301/CA30; 4G146/CB19; 4G146/CB35; 5G301/CD01;  
5H026/EE02; 5H018/EE03; 5H018/EE05; 5H026/EE05;  
5H026/EE11; 5H026/EE18

## BASIC ABSTRACT:

US 20070104993 A1 UPAB: 20090423

NOVELTY - A solid acid comprises a carbon nano tube (CNT); a spacer group combined with the CNT; and an ionically conductive functional group connected to the spacer group.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for:

(1) a polymer electrolyte membrane comprising an ionic conducting polymer, and solid acid; and

(2) a fuel cell comprising a cathode; an anode; and a polymer electrolyte membrane interposed between the cathode and the anode.

USE - For polymer electrolyte membrane (as electrolyte membrane) useful for a fuel cell (claimed) e.g. phosphoric acid fuel cell, a polymer electrolyte membrane fuel cell, an alkaline fuel cell, or preferably a direct methanol fuel cell.

ADVANTAGE - The solid acid provides polymer electrolyte membrane having excellent ionic conductivity and low cross-over of methanol; and provides fuel cell having improved efficiency.

DESCRIPTION OF DRAWINGS - The figure is a graph illustrating the results of x-ray photoelectron spectrum analysis of a sulfonated carbon nano tube. TECHNOLOGY FOCUS:

METALLURGY - Preferred Component: The cathode includes a catalyst layer including platinum catalyst supported on carbon; and the anode includes a catalyst layer including platinum-ruthenium catalyst supported on carbon.

ORGANIC CHEMISTRY - Preferred Component: The spacer group is a divalent aromatic group, a divalent aliphatic group, or a divalent aromatic group substituted with an aliphatic substituent. It is -C6H4-. The aromatic group includes a compound consisting unsubstituted phenylene (-C6H4-); a substituted phenylene from -X1C6H3- or -X22C6H2-; -C6H4NHC6H3X3-; -C6H4COC6H4-; -C6H4S- (diphenyl sulfide); unsubstituted naphthylene (-C10H5-); or substituted naphthylene (-C10H4X4-). X1-X4=-F, -Cl, -Br, -I, -NH2, Me group, Et group, propyl group, methoxy group, ethoxy group, hydroxy group, nitro group, or propyloxy group.

The aliphatic group includes a compound from -(CH2)n-, -CH2CH2O-, -CH2CH2CH(OH)-, -CH2CH(OH)CH2-, -CH2COC6H2CH2-, -(CH=CH)n-, -(CH2CH2NH)-, -C3H4- (cyclopropane), -C5H8- (cyclopentane), -C6H10- (cyclohexane), or -CH2C6H10-. n=1-12.

The aromatic group substituted with the aliphatic substituent includes a compound consisting -C6H4(CH2)n-, -C6H4CONHC6H2CH2-, -CH2C6H4SC6H4CH2-, or -C6H4CH2CH2-. n=1-3.

The ionically conductive functional group includes a compound(s) from -COOH, -PO3H, -OH, -OSO3H, -OP(O)(OH)3, or preferably -SO3H. Preferred Compound: The solid acid is a compound of formula CNT-(CO-R1-X)n (1).

CNT=single walled carbon nanotube or a

multi walled carbon nanotube;

R1=divalent organic group, preferably -OR2- or -NHR3-;

X=univalent ionically conductive functional group;

n=greater than or equal to 1; and

R2, R3=divalent aromatic group, divalent aliphatic group, or divalent aromatic group substituted with an aliphatic substituent.

The solid acid is a compound of formula (3), (4),

(5), or (6).

R2=1-20C alkylene group; and

R3=1-20C arylene group.

Preferred Parameter: The length of the CNT in (1) is less than or equal to 500 nm.

POLYMERS - Preferred Component: The ionic conducting polymer includes a material consisting polyimide, polyalkylether, polyethylene carbonate, polyvinyl alcohol, polyethylenimine, Nafion(RTM: perfluoro-sulfonic acid polymer), polyvinylidene fluoride, polyether sulfone, poly ether ether ketone, and/or their copolymers. Preferred Composition: The amount of solid acid is 0.1-40 pbw, based on 100 pbw of the ionic conducting polymer.

#### EXTENSION ABSTRACT:

EXAMPLE - Sulfanilic acid (1.73 g) and sodium nitrate (1.73 g) were added to single walled carbon nanotube (0.1 g), and the result was placed in a reactor kept at 0degreesC, while concentrated sulfuric acid (50 ml) was added, and stirred regularly at 60degreesC for 4 hours and 30 minutes to allow a reaction to occur. Then, a vacuum aspirator was connected to filter sulfuric acid from the reactor and a product of the reaction ( carbon nano tube (CNT) solid acid) was obtained. The CNT solid acid was washed with dimethylformamide as a solvent and washed again with diethylethers. It was dried at 30degreesC for 24 hours to obtain a desired CNT solid acid.

FILE SEGMENT:

CPI; EPI

MANUAL CODE:

CPI: A09-A03; A12-E06B; A12-M; E05-G09;

E05-U03; L03-E04A2

EPI: X16-C01C; X16-E06A5C

L33 ANSWER 7 OF 18

WPIX COPYRIGHT 2010

THOMSON REUTERS on STN

ACCESSION NUMBER:

2007-531634 [200752] WPIX

DOC. NO. CPI:

C2007-196279 [200752]

DOC. NO. NON-CPI:

N2007-408605 [200752]

TITLE:

Dispersant for carbon nanotube  
useful in e.g. field emission display comprises  
head part with N/S/O containing polyaromatic, amino  
or thiol group; and tail part with  
carboxylic/sulfonic/phosphoric  
acid containing polyoxyalkylene

DERWENT CLASS:

A97; E13; G02; G06; L03; V05

INVENTOR:

CHOI J Y; IN Z; KIM D Y; LEE E S; YOON S M; EUN S  
L; JAE Y C

PATENT ASSIGNEE:

(SMSU-C) SAMSUNG ELECTRONICS CO LTD; (CHOI-I) CHOI  
J Y; (KIMD-I) KIM D Y; (LEEE-I) LEE E S; (YOON-I)  
YOON S M

COUNTRY COUNT:

3

PATENT INFORMATION:

PATENT NO

KIND DATE

WEEK

LA PG

MAIN IPC

US 20070078215	A1	20070405	(200752)*	EN	14[7]
JP 2007099611	A	20070419	(200752)	JA	21
KR 2007038251	A	20070410	(200761)	KO	
KR 815028	B1	20080318	(200924)	KO	

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 20070078215	A1	US 2006-352137	20060210
KR 2007038251	A	KR 2005-93352	20051005
JP 2007099611	A	JP 2006-226542	20060823
KR 815028	B1	KR 2005-93352	20051005

## FILING DETAILS:

PATENT NO	KIND	PATENT NO
KR 815028	B1	Previous Publ
		KR 2007038251

PRIORITY APPLN. INFO: KR 2005-93352 20051005

## INT. PATENT CLASSIF.:

## IPC ORIGINAL:

B01F0017-00 [I,C]; B01F0017-32 [I,A]; B01F0017-42 [I,A]; B01F0017-42 [I,C]; C01B0031-00 [I,C]; C01B0031-02 [I,A]; C07C0043-00 [I,A]; C07C0043-00 [I,C]; C08G0061-00 [I,C]; C08G0061-12 [I,A]; C08J0003-02 [I,A]; C08J0003-02 [I,A]; C08J0003-02 [I,C]; C08K0003-00 [I,C]; C08K0003-00 [I,A]; C08K0003-04 [I,A]; C08K0003-04 [I,C]; C08L0065-00 [I,A]; C08L0065-00 [I,C]; C09C0001-44 [I,A]; C09C0001-44 [I,C]

ECLA: C08G0061-12D1B; C08G0061-12D1D; C08G0061-12D1F; C08L0065-00

ICO: Y01N0006:00

USCLASS NCLM: 524/495.000

NCLS: 106/472.000; 568/606.000

## JAP. PATENT CLASSIF.:

## MAIN/SEC.:

B01F0017-32; B01F0017-42; C01B0031-02 101 F;  
C08G0061-12; C08K0003-04; C08L0065-00; C09C0001-44

## FTERM CLASSIF.:

4D077; 4G146; 4J002; 4J032; 4J037; 4D077/AA01;  
4J037/AA01; 4G146/AA11; 4D077/AB01; 4D077/AC05;  
4D077/BA02; 4D077/BA03; 4J032/BA03; 4G146/BA04;  
4J032/BA04; 4D077/BA07; 4J032/BA08; 4D077/BA13;  
4J032/BA13; 4J032/BB01; 4J032/BB09; 4J037/CB03;  
4J037/CB04; 4J037/CB07; 4G146/CB10; 4J037/CB19;  
4J037/CB21; 4J037/CB22; 4G146/CB35; 4J037/CC13;  
4J037/CC15; 4J037/CC16; 4J037/CC24; 4J037/CC29;  
4J002/CE00.1; 4J032/CG08; 4J002/DA01.6;  
4D077/DC07.Y; 4D077/DC12.Y; 4D077/DC26.Y;  
4D077/DC39.Y; 4D077/DC51.Y; 4D077/DC59.Y;  
4D077/DC67.Y; 4D077/DD03.Y; 4D077/DD04.Y;  
4D077/DD05.Y; 4J037/DD24; 4D077/DD33.Y;  
4J002/DE01.7; 4D077/DE01.Y; 4D077/DE08.Y;  
4D077/DE10.Y; 4D077/DE12.Y; 4D077/DE16.Y;  
4D077/DE28.Y; 4D077/DE32.Y; 4J037/EE08; 4J037/EE43;  
4J002/FD20.1; 4J037/FF15; 4J002/HA06

## BASIC ABSTRACT:

US 20070078215 A1 UPAB: 20090423

NOVELTY - A dispersant (D1) for a carbon nanotube composition comprises a head part comprising N/S/O containing polyaromatic group, amino or thiol group; and a tail part comprising carboxylic/sulfonic/phosphoric acid containing polyoxyalkylene.

DETAILED DESCRIPTION - A dispersant (D1) for a carbon nanotube composition comprises a head part comprising N/S/O containing polyaromatic group of formula (I), amino (-NH<sub>2</sub>) group or thiol (-SH) group; and a tail part comprising carboxylic/sulfonic/phosphoric acid containing polyoxyalkylene of formula -(YOa)-(CH<sub>2</sub>)<sub>n</sub>-Z.

X=S, NH or O;

i=1 - 60;

Y=1-10C alkylene, 1-10C alkenylene, 1-10C alkynylene, 6-20C

arylalkylene (all optionally substituted);

Z=H, CH<sub>3</sub>, OH, carboxylic acid or its salt, sulfonic acid or its salt, phosphoric acid or its salt;

a=0 or 1;

m=1 -9;and

n=0 - 9.

An INDEPENDENT CLAIM is included for composition comprising the dispersant (D1), a carbon nanotube, and a dispersion medium containing an organic solvent and/or water.

USE - As dispersant for preparing carbon nanotube compositions (claimed) useful in industrial fields e.g. emitters of field emission displays (FEDs), carbon nanotube inks, printable carbon nanotubes .

ADVANTAGE - The dispersant provides convenient preparation of carbon nanotube compositions. The dispersant provides excellent stabilizing and dispersing effects of the carbon nanotube in a variety of dispersion media including organic solvents and/or water. The carbon nanotube composition containing the dispersant exhibits pronounced viscosity-reducing effects as compared to the composition without dispersant.

TECHNOLOGY FOCUS:

INORGANIC CHEMISTRY - Preferred Components: The

carbon nanotube is selected from single-walled

carbon nanotube (SWNT), double-walled

carbon nanotube (DWNT), multi-walled

carbon nanotube (MWNT) and/or bundle of

carbon nanotube.

ORGANIC CHEMISTRY - Preferred Components: The organic

solvent is selected from alcohols (such as methyl alcohol, ethyl

alcohol, n-propyl alcohol, isopropyl alcohol, n-butyl alcohol,

sec-butyl alcohol, t-butyl alcohol, isobutyl alcohol or diacetone

alcohol); ketones (such as acetone, methyl ethyl ketone and methyl

isobutyl ketone); glycols such as ethylene glycol, diethylene

glycol, triethylene glycol, propylene glycol, butylene glycol,

hexylene glycol, 1,3-propanediol, 1,4-butanediol,

1,2,4-butanetriol, 1,5-pentanediol, 1,2-hexanediol or

1,6-hexanediol); glycol ethers (such as ethylene glycol monomethyl

ether or triethylene glycol monoethyl ether); glycol ether acetates

(such as propylene glycol monomethyl ether acetate (PGMEA));

acetates (such as ethyl acetate, butoxyethoxy ethyl acetate, butyl

carbitol acetate (BCA) or dihydroterpineol acetate (DHATA));

terpineols; trimethyl pentanediol monoisobutyrate (TEXANOL);

dichloroethene (DCE); and/or 1-methyl pyrrolidone (NMP).

POLYMERS - Preferred Dispersant: The dispersant (D1) has a

molecular weight of less than 10000 and is selected from

poly(3-hexylthiophene) (having a molecular weight of less than

10000), 3-hexylthiophene, 3-dodecylthiophene,

poly(3-pentadecylpyrrole), hexylpyrrole, dodecylpyrrole,

hexylthiol, dodecanethiol, polyhexylaniline, compound of

formula of (Ia) or (Ib). The tail part of the dispersant contains

3-20C polyethylene oxide 4-20C polypropylene oxide.

x=1 - 60;

y=1 - 12; and

z=1 - 60.

Preferred Composition: The composition comprises (parts by weight): dispersant (D1) (0.001 - 10), carbon nanotube (0.01 - 5), and dispersion medium (selected from an organic solvent and/or water) (balance). The mixing weight ratio of the carbon nanotube to dispersant is 1:0.001 - 1:10. The composition further comprises at least one additive (0.1 - 60 parts by weight) selected from organic binder (preferably cellulose including ethylcellulose, styrene, styrene-acrylate copolymer, polyvinylbutyral, polyvinyl alcohol and/or polypropylene carbonate), photosensitive monomer, photoinitiator, viscosity-adjusting agent, storage stabilizer, wetting agent, acid or base.

#### EXTENSION ABSTRACT:

##### EXAMPLE - A carbon nanotube composition

(test) was prepared by dissolving ethylcellulose (8.335 g), terpineol solvent (13.775 g), dispersant of formula (Ix) (0.019 g), and multi-walled carbon nanotubes (MWNs) (0.38 g). Another carbon nanotube composition (control) was prepared in the same manner, except that the dispersant was not added to the solution. Changes in viscosity of the carbon nanotube compositions were measured with increasing shear rates. The viscosity of the composition at different shear rates was measured on a viscometer at a temperature of 24.5 - 25.5 degrees C for 30 sec. The carbon nanotube compositions were printed to a thickness of 30 microns on glass substrates and were fired at 380 degrees C in the air to obtain carbon nanotube films. Surfaces of the obtained carbon nanotube films were photographed under a scanning electron microscope. The results showed that the carbon nanotube film prepared by test composition exhibited homogeneous and good dispersion of carbon nanotubes, as compared to the carbon nanotube film prepared with control composition. The control composition exhibited a viscosity of 66000 cps at 2 revolutions per minute (rpm) and 23400 cps at 20 rpm, respectively, while the test composition exhibited a lower viscosity of 46500 cps at 2 rpm and 14325 cps at 20 rpm respectively.

#### FILE SEGMENT:

##### MANUAL CODE:

CPI; EPI

CPI: A12-W12C; A12-W14; E05-G02; E05-G09C;

E05-U03; E07-A01; E07-B01; E07-D02;

G02-A04A; G06-D06B; L03-A02B; L03-A02G; L03-G05D

EPI: V05-D01C3; V05-D05C5

L33 ANSWER 8 OF 18

WPIX COPYRIGHT 2010

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ACCESSION NUMBER:

2007-485561 [200748] WPIX

DOC. NO. CPI:

C2007-178545 [200748]

DOC. NO. NON-CPI:

N2007-368834 [200748]

TITLE:

Preparation of metal catalyst carrying carbon nanotube, for electrode catalyst of fuel cells, involves forming opening and defective portion on surface of carbon nanotube by oxidation, and fixing metal catalyst to carbon nanotube

DERWENT CLASS:

E13; L03; X16

INVENTOR:

NAKAMURA J; YU E J

PATENT ASSIGNEE: (UYTS-N) UNIV TSUKUBA  
COUNTRY COUNT: 1

## PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
JP 2006334527	A	20061214	(200748)*	JA	11	[2]

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
JP 2006334527 A		JP 2005-163348	
20050602			

PRIORITY APPLN. INFO: JP 2005-163348 20050602

## INT. PATENT CLASSIF.:

IPC ORIGINAL: B01J0023-46 [I,A]; B01J0037-00 [I,C]; B01J0037-02 [I,A]; B01J0037-12 [I,A]; B01J0037-14 [I,A]; B01J0037-34 [I,A]; H01M0004-88 [I,A]

## JAP. PATENT CLASSIF.:

MAIN/SEC.: B01J0023-46 301 M; B01J0037-02 101 A; B01J0037-12; B01J0037-14; B01J0037-34; C01B0031-02 101 F; H01M0004-88 K; H01M0008-10

## FTERM CLASSIF.:

4G069; 4G146; 4G169; 5H018; 5H026; 4G169/AA03; 5H026/AA06; 4G146/AA11; 4G146/AA12; 4G146/AA16; 4G146/AC03.A; 4G146/AC03.B; 4G146/AD23; 4G146/AD24; 4G146/AD35; 5H018/AS01; 4G146/BA04; 4G169/BA08.A; 4G169/BA08.B; 4G169/BA27.C; 5H018/BB00; 4G169/BB02.A; 4G169/BB02.B; 4G169/BB08.C; 4G169/BB12.C; 5H018/BB16; 4G169/BC31.A; 4G169/BC32.A; 4G169/BC33.A; 4G169/BC66.A; 4G169/BC67.A; 4G169/BC68.A; 4G169/BC70.A; 4G169/BC70.B; 4G169/BC71.A; 4G169/BC72.A; 4G169/BC75.A; 4G169/BD12.C; 4G169/BE11.C; 4G146/CB12; 4G146/CB14; 4G146/CB22; 4G146/CB32; 4G146/CB34; 4G146/CB36; 4G146/CB37; 4G169/CC32; 4G169/EB14.X; 4G169/EB14.Y; 5H018/EE02; 5H018/EE03; 5H018/EE04; 5H018/EE05; 4G169/FB14; 4G169/FB17; 4G169/FB18; 4G169/FB40; 4G169/FB41; 5H018/HH01

## BASIC ABSTRACT:

JP 2006334527 A UPAB: 20070727

NOVELTY - An opening and a defective portion are formed on the surface of carbon nanotube by oxidation. A metal catalyst is fixed to carbon nanotube to form metal catalyst carrying carbon nanotube.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for metal catalyst carrying carbon nanotube formed by above method.

USE - For forming metal catalyst carrying carbon nanotube used for removing harmful substances in water, and used as electrode catalyst for fuel cell.

ADVANTAGE - The method forms metal catalyst carrying carbon nanotube having excellent catalytic property and durability. The metal catalyst carrying carbon nanotube effectively removes contaminants in water. TECHNOLOGY FOCUS:

INORGANIC CHEMISTRY - Preferred Process: Precursor substance of metal catalyst is introduced into the carbon nanotube through the opening, and the metal catalyst is fixed in the carbon nanotube.

The hydroxyl, carboxyl, carbonyl or sulfone group of the precursor of metal catalyst in the opening and defective portion of

the carbon nanotube is made to react, and the metal catalyst is adhered to the inner and outer surface of the carbon nanotube.

Preferred Compounds: The precursor of metal catalyst contains acetyl acetate complex, nitrite or chloride.

Oxidation is carried out using nitric acid, sulfuric acid, hydrogen peroxide, ozone, oxygen, ammonium persulfate and/or sodium hypochlorite.

The carbon nanotube is mono carbon nanotube having outer diameter of 0.85-2 nm or multilayered carbon nanotube having outer diameter of 5-50 nm.

METALLURGY - Preferred Compounds: The metal of the metal catalyst is chosen from iron, cobalt, nickel, copper, gold, silver, platinum, ruthenium, rhodium and/or palladium.

FILE SEGMENT: CPI; EPI  
MANUAL CODE: CPI: E05-U03; E11-N; E31-A02A; E31-A03;  
E31-A05; E31-D01; E31-D02; L03-E04B1; N02  
EPI: X16-E06A1A; X16-E06A5A

L33 ANSWER 9 OF 18 WPIX COPYRIGHT 2010 THOMSON REUTERS on STN  
ACCESSION NUMBER: 2007-439421 [200742] WPIX  
DOC. NO. CPI: C2007-159704 [200742]  
DOC. NO. NON-CPI: N2007-331425 [200742]  
TITLE: Catalyst for use in membrane electrode assembly  
useful for fuel cell e.g. direct oxidation fuel  
cell or direct methanol fuel cell for fuel cell  
system, comprises carbon-based material on which  
platinum nanowire is supported  
DERWENT CLASS: E17; J04; L03; X16  
INVENTOR: ALEXANDROVICHSEROV A; KWAK C; LEE S; LEE S H; MIN  
M; MIN M K; PARK C; PARK C H; PARK Y; PARK Y G;  
ALEXEY A  
PATENT ASSIGNEE: (ALEX-I) ALEXANDROVICHSEROV A; (KWAK-I) KWAK C;  
(LEES-I) LEE S; (MINM-I) MIN M; (PARK-I) PARK C;  
(PARK-I) PARK Y; (SMSU-C) SAMSUNG SDI CO LTD  
COUNTRY COUNT: 3

# PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
US 20070099069	A1	20070503	(200742)*	EN	15[7]	
CN 1983688	A	20070620	(200774)	ZH		
KR 684854	B1	20070220	(200924)	KO		
CN 100487965	C	20090513	(200969)	ZH		

# APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 20070099069	A1	US 2006-591501	20061102
KR 684854	B1	KR 2005-104202	
20051102			
CN 1983688	A	CN 2006-10064098	20061102
CN 100487965	C	CN 2006-10064098	20061102

PRIORITY APPLN. INFO: KR 2005-104202 20051102

INT. PATENT CLASSIF.:

IPC ORIGINAL: B01J0021-00 [I,A]; B01J0021-00 [I,C]; B01J0021-18



[I,A]; B01J0023-40 [I,A]; B01J0023-42 [I,A];  
 B01J0023-42 [I,C]; B01J0023-42 [I,C]; B01J0032-00  
 [I,A]; B01J0032-00 [I,C]; B01J0037-00 [I,A];  
 B01J0037-00 [I,C]; B82B0001-00 [I,A]; B82B0001-00  
 [I,C]; B82B0003-00 [I,A]; B82B0003-00 [I,C];  
 H01M0004-86 [I,A]; H01M0004-86 [I,C]; H01M0004-88  
 [I,A]; H01M0004-88 [I,C]; H01M0004-88 [I,C];  
 H01M0004-90 [I,C]; H01M0004-90 [I,C]; H01M0004-92  
 [I,A]; H01M0004-96 [I,A]; H01M0004-96 [I,C];  
 H01M0008-02 [I,A]; H01M0008-02 [I,C]  
 H01M0004-88; H01M0004-92  
 T01M0004:92S2; Y01N0006:00  
 USCLASS NCLM: 429/044.000  
 NCLS: 502/101.000; 502/180.000; 502/339.000

## BASIC ABSTRACT:

US 20070099069 A1 UPAB: 20090423

NOVELTY - A catalyst for a fuel cell, comprises a carbon-based material on which a platinum nanowire is supported.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for:

- (1) a membrane electrode assembly (151) including a catalyst layer having the catalyst; and
- (2) a method of manufacturing a catalyst for a fuel cell, comprising preparing a carbon-based material; adding a catalyst metal precursor solution including a catalyst metal precursor to the carbon-based material to prepare a catalyst precursor; and heat-treating the catalyst precursor to obtain the catalyst supported on the carbon-based material on which the platinum (Pt) nanowire is supported.

USE - The catalyst is for use in a membrane electrode assembly useful for a fuel cell (claimed) e.g. direct oxidation fuel cell or direct methanol fuel cell for fuel cell system (100). It is used in an anode and a cathode of membrane electrode assembly.

ADVANTAGE - The catalyst has excellent electro-conductivity and catalyst activity. The usage efficiency of Pt and carbon-based material is increased, securing excellent performance of a fuel cell.

DESCRIPTION OF DRAWINGS - The figure schematically shows the structure of a fuel cell system.

- Fuel cell system (100)
- Fuel supplier (101)
- Oxidant supplier (103)
- Fuel pump (120)

Membrane electrode assembly (151) TECHNOLOGY FOCUS:

INORGANIC CHEMISTRY - Preferred Component: The catalyst comprises Pt nanoparticles positioned in the Pt nanowire and supported on the carbon-based material; and a supporting aid, which is a compound including an element from silicon, zirconium, aluminum, and/or titanium. The carbon-based material is a vapor grown carbon fiber, a carbon nanohorn, a carbon nanoring, a carbon nanowire, a carbon nanorod, preferably a carbon nanotube. The catalyst metal precursor is hexachloroplatinum hydride (H<sub>2</sub>PtCl<sub>6</sub>), platinum chloride (PtCl<sub>2</sub>), platinum bromide (PtBr<sub>2</sub>), diammine platinum di(nitrite) ((NH<sub>3</sub>)<sub>2</sub>Pt(NO<sub>2</sub>)<sub>2</sub>), potassium chloroplatinate (K<sub>2</sub>PtCl<sub>6</sub>), (K<sub>2</sub>PtCl<sub>4</sub>), potassium platinocyanide (K<sub>2</sub>(Pt(CN)<sub>4</sub>)<sub>3</sub>H<sub>2</sub>O), K<sub>2</sub>Pt(NO<sub>2</sub>)<sub>4</sub>, sodium platinum chloride (Na<sub>2</sub>PtCl<sub>6</sub>), Na<sub>2</sub>(Pt(OH)<sub>6</sub>), platinum acetylacetonate, and/or ammonium tetrachloroplatinate. Preferred Parameter: The Pt nanowire has an average diameter of 1.5-10 nm and a length of 3 nm-10 microns. The Pt nano-particles have an average particle size of 2-8 nm. The Pt nanowire and Pt nano-particles are included in a weight ratio of 10:90-90:10. The carbon-based material has an aspect ratio of greater than or equal to 1. The

carbon-based material and the catalyst metal precursor are mixed in a weight ratio of 60:40-90:10. The supporting aid is mixed in 2-6 times as much as the weight of the platinum. Preferred Composition: The Pt nanowire is supported on the carbon-based material in 5-90 weight%, based on the total weight of the catalyst. The supporting aid is included in less than or equal to 5 weight%, based on the total weight of the catalyst. Preferred Method: Preparation of the carbon-based material comprises acid-treating the carbon-based material by using an acid, washing the carbon-based material, and heat-treating the carbon-based material to remove the acid. The method comprises mixing the carbon-based material and supporting aid before the addition of the catalyst metal precursor solution. The supporting aid is mixed with the carbon-based material in an organic solvent and/or water; and after mixing, the mixture is dried and powdered. The method comprises eluting the supporting aid after heat-treatment to decrease the amount of the supporting aid remaining in the catalyst to less than or equal to 5 weight%, where heat-treatment is performed at less than or equal to 250 degrees C.

## EXTENSION ABSTRACT:

EXAMPLE - Carbon nanotube (5 g) was put in a 60% nitric acid solution. The mixture was agitated at room temperature for 5 hours, and washed with distilled water. Then, it was filtered and heat-treated at 400 degrees C for 5 hours to remove nitric acid remaining in the carbon nanotube. The pre-treated carbon nanotube (5 pbw) was mixed with fumed silica (surface area: 380 m<sup>2</sup>/g) (95 pbw). Then, the resulting mixture was mixed with a solvent of n-propylalcohol, isopropylalcohol, and water, which was mixed in a volume ratio of 1:1:1. The mixture was dried, and ground with to prepare a powder-shaped support. Next, H<sub>2</sub>PtCl<sub>6</sub> solution (20 pbw) was added to support (80 pbw) in a dropwise fashion to prepare a catalyst precursor supported on the support. The catalyst precursor supported on the support was treated with an ultrasound, and then dried. The dried product was ground, and heat-treated at 200 degrees C for 5 hours under a hydrogen atmosphere. Then, it was treated with HF to remove fumed silica used as a supporting aid, preparing a Pt nanowire catalyst for a fuel cell supported on carbon nanotube. The prepared catalyst included 80 weight% of Pt nanowire and Pt nano-particles based on the entire catalyst weight. The Pt nanowire was included in the catalyst at 30-40 weight% more than the Pt nano-particles.

FILE SEGMENT:

CPI; EPI

MANUAL CODE:

CPI: E05-U03; E31-N04D; J04-E04D;  
L03-E04B1; L03-E04H2; N01-D02; N02-F01; N06-E01;  
N06-F; N07-L03A  
EPI: X16-E06A5A; X16-E06A5C

L33 ANSWER 10 OF 18

WPIX COPYRIGHT 2010 THOMSON REUTERS ON STN

ACCESSION NUMBER:

2007-388485 [200736] WPIX

DOC. NO. CPI:

C2007-140029 [200736]

DOC. NO. NON-CPI:

N2007-291384 [200736]

TITLE:

Membrane electrode assembly for fuel cell,  
comprises anodic current collector, cathodic  
current collector, anodic current  
collector-protecting layer and cathodic current  
collector-protecting layer

DERWENT CLASS:

A85; E32; L03; X16

INVENTOR:

CHANG H; KIM H; OH J; KIM H K; OH J M

September 20, 2010

10/593,918

43

PATENT ASSIGNEE: (SMSU-C) SAMSUNG DENKAN KK; (SMSU-C) SAMSUNG SDI CO LTD  
COUNTRY COUNT: 4

## PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
US 20070072056	A1	20070329	(200736)*	EN	11[5]	
JP 2007087955	A	20070405	(200736)	JA	16	
CN 1937292	A	20070328	(200751)	ZH		
KR 2007034252	A	20070328	(200755)	KO		
KR 723385	B1	20070523	(200833)	KO		
CN 100517822	C	20090722	(201001)	ZH		

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 20070072056 A1		US 2006-508158	20060823
KR 2007034252 A		KR 2005-88716	20050923
KR 723385 B1		KR 2005-88716	20050923
JP 2007087955 A		JP 2006-256797	20060922
CN 1937292 A		CN 2006-10159506	20060925
CN 100517822 C		CN 2006-10159506	20060925

## FILING DETAILS:

PATENT NO	KIND	PATENT NO
KR 723385 B1	Previous Publ	KR 2007034252 A

PRIORITY APPLN. INFO: KR 2005-88716

20050923

## INT. PATENT CLASSIF.:

## IPC ORIGINAL:

H01M0004-86 [I,A]; H01M0004-86 [I,C]; H01M0004-86 [I,C]; H01M0004-86 [I,A]; H01M0004-86 [I,C]; H01M0004-86 [I,A]; H01M0004-86 [I,C]; H01M0004-94 [I,A]; H01M0004-94 [I,C]; H01M0004-96 [I,C]; H01M0004-96 [I,A]; H01M0004-96 [I,C]; H01M0008-02 [I,C]; H01M0008-02 [I,A]; H01M0008-02 [I,C]; H01M0008-02 [I,A]; H01M0008-02 [I,C]; H01M0008-10 [I,C]; H01M0008-10 [I,A]; H01M0008-10 [I,C]; H01M0008-10 [I,A]; H01M0008-10 [I,C]

## ECLA:

H01M0008-02C12; H01M0008-02C4A; H01M0008-02C4C; H01M0008-02C4D; H01M0008-02C4F; H01M0008-02C4K1; H01M0008-02C4K2; H01M0008-02C6; H01M0008-10B2

## ICO:

T01M0008:02C2A2; T01M0008:02C2A2F

## USCLASS NCLM:

429/044.000

## NCLS:

429/030.000; 429/042.000

## JAP. PATENT CLASSIF.:

## MAIN/SEC.:

H01M0004-86 B; H01M0004-86 H; H01M0004-86 M; H01M0004-96 B; H01M0008-02 E; H01M0008-10

## FTERM CLASSIF.:

5H018; 5H026; 5H018/AA07; 5H026/AA08; 5H018/CC06; 5H018/EE02; 5H026/EE02; 5H018/EE03; 5H018/EE04; 5H018/EE05; 5H026/EE05; 5H018/EE06; 5H026/EE06; 5H018/EE08; 5H026/EE08; 5H018/EE10; 5H018/EE12; 5H026/EE12; 5H018/EE17; 5H026/EE18; 5H018/HH03; 5H026/HH03; 5H018/HH04; 5H026/HH04; 5H018/HH06; 5H026/HH06

## BASIC ABSTRACT:

US 2007/0072056 A1 UPAB: 20091001

NOVELTY - A membrane electrode assembly comprises electrolyte membrane (10) having anodic catalyst layer (22) on one side and cathodic catalyst layer (24) on the opposite side; anodic current collector-protecting layer (32) disposed on the anodic catalyst layer; cathodic current collector-protecting layer (34) disposed on the cathodic catalyst layer; anodic current collector (36) and cathodic current collector (38); anodic diffusion layer (42) disposed on the anodic current collector; and cathodic diffusion layer (44) disposed on the cathodic current collector.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for:

- (1) fuel cell comprising the membrane electrode assembly; and
- (2) electrode of a membrane electrode assembly comprising a catalyst layer; a current collector protecting layer; a current collector; and a fuel diffusion layer, where the current collector-protecting layer is between the current collector and the catalyst layer, and the current collector and current collector-protecting layer are between the diffusion layer and the catalyst layer.

The assembly further comprises support layers on the anodic diffusion layer and the cathodic diffusion layer, respectively.

USE - For fuel cell, e.g. proton exchange membrane fuel cell (PEMFC), direct methanol fuel cell (DMFC), or a phosphoric acid fuel cell (PAFC).

ADVANTAGE - Electrical resistance is minimized by including a current collector between catalyst layer and fuel diffusion layer inside electrodes to shorten the electron transfer distance. Corrosion of the current collector due to direct contact between the current collector and the catalyst in the catalyst layer is prevented by including an electrically conductive current collector-protecting layer. A fuel cell stably exhibits constant performance for a prolonged period of time, and has excellent efficiency due to low electrical resistance.

DESCRIPTION OF DRAWINGS - The figure is a cross-sectional view of a membrane electrode assembly.

- Electrolyte membrane (10)
- Anodic catalyst layer (22)
- Cathodic catalyst layer (24)
- Anodic current collector-protecting layer (32)
- Cathodic current collector-protecting layer (34)
- Anodic current collector (36)
- Cathodic current collector (38)
- Anodic diffusion layer (42)
- Cathodic diffusion layer (44)

TECHNOLOGY FOCUS:

CERAMICS AND GLASS - Preferred Materials: The support layer comprises a ceramic material consisting of metal oxide, silica based compound, clay, silicon carbide or cordierite.

METALLURGY - Preferred Materials: The current collector-protecting layer comprises a conductive metal that has a conductivity of greater than or equal to 5/cm. The conductive metal and the current collector comprises gold (Au), silver (Ag), aluminum (Al), nickel (Ni), copper (Cu), platinum (Pt), titanium (Ti), manganese (Mn), zinc (Zn), iron (Fe), tin (Sn), or their alloys. The current collector is a metal mesh. The support comprises a metal.

ORGANIC CHEMISTRY - Preferred Materials: The current collector-protecting layer comprises at least one carbonaceous material selected from powdered carbon, graphite, carbon black, acetylene black, activated carbon, carbon nanotube, carbon nanofiber, carbon nanowire, carbon nanohorn, carbon nanoring or fullerene (C60). The current collector-protecting layer comprises a porous material having a porosity of 10-90%. The support layer comprises a

carbonaceous material selected from the group consisting of carbon fiber, carbon paper, carbon cloth, carbon nanotube, carbon nanofiber, carbon nanohorn, carbon nanoring, carbon black, graphite, fullerene, activated carbon, and acetylene black.

**POLYMERS - Preferred Materials:** The current collector-protecting layer comprises at least one electrically conductive polymer selected from polyaniline, polypyrrole or polythiophene. The diffusion layer comprises an electrically conductive material, and/or a non-conductive material. The electrically conductive material is a carbonaceous material. The non-conductive material is a hydrophobic material, a hydrophilic material, a hydrous material, and/or porous material. The hydrophobic material is a polyethylene resin, a polystyrene resin, a fluoropolymer resin, a polypropylene resin, a polymethyl methacrylate resin, a polyimide resin, a polyamide resin, and/or polyethylene terephthalate resin. The hydrophilic material is a polymer resin containing a hydroxyl group, a carboxyl group, an amine group or a sulfone group at terminal(s), a polyvinyl alcohol resin, a cellulose-based polymer resin, a polyvinylamine resin, a polyethylene oxide resin, a polyethylene glycol resin, a nylon-based polymer resin, a polyacrylate resin, a polyester resin, a polyvinylpyrrolidone resin, and/or ethylene vinyl acetate-based resin. The hydrous material is a polymer resin containing a hydroxyl group, a carboxyl group, an amine group or a sulfone group at terminal(s), a polyvinyl alcohol resin, a cellulose-based polymer resin, a polyvinylamine resin, a polyethylene oxide resin, a polyethylene glycol resin, a nylon-based polymer resin, a polyacrylate resin, a polyester resin, a polyvinylpyrrolidone resin, an ethylene vinyl acetate-based resin, aluminum oxide, zirconium oxide, titanium oxide, and silicon oxide.

FILE SEGMENT: CPI; EPI  
 MANUAL CODE: CPI: A12-E06A; A12-E06B; A12-E07A; E05-U03  
 ; E10-E04E1; E10-E04L1; E11-N; E31-A05; E31-D01;  
 E31-D02; E31-N05C; E31-P03; E34-C02; E35-K02;  
 E35-L; L03-E04B; N07-L03A  
 EPI: X16-E06A5C

L33 ANSWER 11 OF 18 WPIX COPYRIGHT 2010 THOMSON REUTERS on STN  
 ACCESSION NUMBER: 2007-151279 [200715] WPIX  
 DOC. NO. CPI: C2007-054569 [200715]  
 DOC. NO. NON-CPI: N2007-109271 [200715]  
 TITLE: Transparent conductor for electronic devices, has  
 preset work function, and comprises conductive  
 nanoparticles and fluorinated acid  
 polymer and/or semiconductive polymer doped with  
 fluorinated acid polymer  
 DERWENT CLASS: A14; A26; A85; E15; U11; U14; X12  
 INVENTOR: HSU C; SKULASON H; HSU C H  
 PATENT ASSIGNEE: (DUPO-C) DU PONT DE NEMOURS & CO E I; (HSUC-I) HSU  
 C; (SKUL-I) SKULASON H  
 COUNTRY COUNT: 113

# PATENT INFORMATION:

PATENT NO	KIND DATE	WEEK	LA	PG	MAIN IPC
WO 2007002737	A2 20070104	(200715)*	EN	55[2]	
EP 1897096	A2 20080312	(200820)	EN		
CN 101208369	A 20080625	(200856)	ZH		

KR 2008031327	A	20080408 (200870)	KO	
JP 2008547185	T	20081225 (200903)	JA	47
US 20100127222	A1	20100527 (201035)	EN	
US 7749407	B2	20100706 (201044)	EN	

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2007002737 A2		WO 2006-US25128	20060628
US 20100127222 A1	Provisional	US 2005-694793P	
20050628			
CN 101208369 A		CN 2006-80022874	20060628
EP 1897096 A2		EP 2006-785720	20060628
US 20100127222 A1		US 2006-476979	20060628
EP 1897096 A2	PCT Application	WO 2006-US25128	20060628
CN 101208369 A	PCT Application	WO 2006-US25128	20060628
KR 2008031327 A	PCT Application	WO 2006-US25128	20060628
JP 2008547185 T	PCT Application	WO 2006-US25128	20060628
JP 2008547185 T		JP 2008-519509	20060628
KR 2008031327 A		KR 2008-702158	20080125
US 7749407 B2	Provisional	US 2005-694793P	
20050628			
US 7749407 B2		US 2006-476979	20060628

## FILING DETAILS:

PATENT NO	KIND	PATENT NO
EP 1897096 A2	Based on	WO 2007002737 A
CN 101208369 A	Based on	WO 2007002737 A
KR 2008031327 A	Based on	WO 2007002737 A
JP 2008547185 T	Based on	WO 2007002737 A

PRIORITY APPLN. INFO: US 2005-694793P 20050628  
US 2006-476979 20060628

## INT. PATENT CLASSIF.:

## IPC ORIGINAL:

C08G0061-00 [I,C]; C08G0061-12 [I,A]; C08K0003-00 [I,C]; C08K0003-04 [I,A]; C08L0101-00 [I,C]; C08L0101-02 [I,A]; C08L0025-00 [I,C]; C08L0025-18 [I,A]; C08L0029-00 [I,C]; C08L0029-10 [I,A]; C08L0033-00 [I,A]; C08L0033-00 [I,C]; C08L0045-00 [I,A]; C08L0045-00 [I,C]; C08L0065-00 [I,A]; C08L0065-00 [I,C]; C08L0079-00 [I,A]; C08L0079-00 [I,C]; C08L0081-00 [I,C]; C08L0081-10 [I,A]; H01B0001-00 [I,A]; H01B0001-00 [I,C]; H01B0001-04 [I,A]; H01B0001-04 [I,C]; H01B0001-08 [I,A]; H01B0001-08 [I,C]; H01B0001-08 [I,C]; H01B0001-12 [I,A]; H01B0001-12 [I,C]; H01B0001-12 [I,C]; H01B0001-12 [I,C]; H01B0001-20 [I,A]; H01B0001-20 [I,C]; H01B0001-22 [I,A]; H01B0001-22 [I,C]; H01B0001-24 [I,A]; H01B0001-24 [I,C]; H01B0001-24 [I,C]; H01B0005-14 [I,A]; H01B0005-14 [I,C]; H01L0051-50 [I,A]; H01L0051-50 [I,C]; H05B0033-26 [I,C]; H05B0033-28 [I,A]

ECLA: H01L0051-00M4D; H01L0051-52B2  
ICO: Y01N0004:00; Y01N0006:00; Y01N0010:00  
USCLASS NCLM: 252/511.000; 252/503.000  
NCLS: 252/500.000; 252/510.000; 252/521.600; 361/437.000;

977/783.000; 977/784.000; 977/788.000; 252/511.000;  
252/512.000; 977/734.000; 977/742.000; 977/773.000

## JAP. PATENT CLASSIF.:

MAIN/SEC.: C08K0003-04; C08L0101-02; C08L0025-18; C08L0029-10;  
C08L0045-00; C08L0065-00; C08L0079-00 A;  
C08L0081-10; H01B0001-12 Z; H01B0005-14 A;  
H05B0033-14 A; H05B0033-28

## FTERM CLASSIF.:

3K107; 4J002; 5G301; 5G307; 3K107/AA01; 3K107/BB01;  
4J002/BC10.1; 4J002/BE04.1; 4J002/BK00.1;  
3K107/CC11; 4J002/CE00.1; 4J002/CM01.1;  
4J002/CM05.1; 4J002/CN05.1; 4J002/DA01.6;  
3K107/DD22; 3K107/DD43.X; 3K107/DD47.X;  
4J002/FA00.6; 5G307/FA01; 5G307/FA02; 4J002/FA04.6;  
4J002/FA05.6; 4J002/FA10.6; 5G307/FB03; 5G307/FC10;  
3K107/FF19; 4J002/GQ02

## BASIC ABSTRACT:

WO 2007002737 A2 UPAB: 20090915

NOVELTY - A transparent conductor has a work function of greater than 4.7 eV, and comprises conductive nanoparticles, and fluorinated acid polymer and/or semiconductive polymer doped with fluorinated acid polymer.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for electronic device (100) comprising the transparent conductor.

USE - For electronic devices (claimed), such as organic LEDs and light-emitting electrochemical cells.

ADVANTAGE - The transparent conductor has a work function high enough to inject holes to the light-emitting layer for organic LED applications.

DESCRIPTION OF DRAWINGS - The figure shows the schematic drawing of the organic electronic device.

Electronic device (100)  
Anode layer (110)  
Optional buffer layer (120)  
Electroactive layer (130)  
Cathode layer (150)

## TECHNOLOGY FOCUS:

METALLURGY - Preferred Nanoparticles: The nanoparticles are carbon and/or metal nanoparticles, preferably nanotubes, fullerenes and/or nanofibers.

ORGANIC CHEMISTRY - Preferred Monomer: The thiophenes have a structure of formula (I) and/or (Ia).

R1 = H, alkyl, alkenyl, alkoxy, alkanoyl, alkythio, aryloxy, alkylthioalkyl, alkylaryl, arylalkyl, amino, alkylamino, dialkylamino, aryl, alkylsulfanyl, alkoxyalkyl, alkylsulfonyle, arylthio, arylsulfanyl, alkoxyalkyl, arylsulfonyle, acrylic acid, phosphoric acid, phosphonic acid, halogen, nitro, cyano, hydroxyl, epoxy, silane, siloxane, alcohol, benzyl, carboxylate, ether, ether carboxylate, amidosulfonate, ether sulfonate, ester sulfonate, or urethane, or both R1 groups together may form alkylene or alkenylene chain completing 3, 4, 5, 6, or 7-membered aromatic or alicyclic ring optionally including divalent nitrogen, sulfur and/or oxygen atoms;

R7 = H, alkyl, heteroalkyl, alkenyl, heteroalkenyl, alcohol, amidosulfonate, benzyl, carboxylate, ether, ether carboxylate, ether sulfonate, ester sulfonate, or urethane; and  
m = 2 or 3.

At least one R7 is not H. The pyrroles have a structure of formula (II).

R1 = as mentioned above; and  
R2 = H, alkyl, alkenyl, aryl, alkanoyl, alkylthioalkyl, alkylaryl, arylalkyl, amino, epoxy, silane, siloxane, alcohol, benzyl, carboxylate, ether, ether carboxylate, ether sulfonate,

ester sulfonate, or urethane.

The anilines have a structure of formula (III),  
(IVa) or (IVb).

a = 0, or 1-4;

b = 1-5;

(a+b) = 5; and

R1 = as mentioned above.

The fused polycyclic heteroaromatics have a structure of e.g.  
formula (V), (Va) or (Vb) (5 more given in the specification).

Q = S or NR6;

R6 = H or alkyl;

R8-R11 = R1;

Q1 = S or NH; and

T = S, NR6, O, SiR62, Se, or PR6.

At least one of R8 and R9, R9 and R10, and R10 and R11  
together form an alkenylene chain completing 5- or 6-membered  
aromatic ring optionally including divalent nitrogen, sulfur and/or  
oxygen atoms. The polycyclic heteroaromatics have a structure of  
formula (VI).

Q, T = as above;

E = alkenylene, arylene or heteroarylene; and

R12 = R1, or two R12 groups together may form alkenylene or  
alkenylene chain completing 3, 4, 5, 6, or 7-membered aromatic or  
alicyclic ring optionally including divalent nitrogen, sulfur  
and/or oxygen atoms.

The styrene sulfonic acids or sulfonated ether  
sulfones have a structure of formula (VII).

b = 1 to 5;

R13 = OH or NHR14; and

R14 = alkyl, fluoroalkyl, sulfonylalkyl, or  
sulfonylfluoroalkyl.

The trifluorostyrene sulfonates have a structure of formula  
(VIII).

W' = (CF2)q, O(CF2)q, S(CF2)q, (CF2)qO(CF2)r, or SO2(CF2)q;

q, r = not defined; and

b, R13, R14 = as mentioned above.

The monomer containing W' equal to S(CF2)q is polymerized  
then oxidized to give the polymer containing W' equal to SO2(CF2)q.  
The sulfonimides have a structure of formula  
-(SO2-Rf-SO2-NH-SO2-Rg-SO2-NH)-n.

Rf = fluorinated alkylene, fluorinated heteroalkylene,  
fluorinated arylene, or fluorinated heteroarylene;

Rg = fluorinated alkylene, fluorinated heteroalkylene,  
fluorinated arylene, fluorinated heteroarylene, arylene, or  
heteroarylene; and

n = 4 or more.

The perfluoroalkyl sulfonate ethers have a structure of  
formula (XI).

R16 = fluorinated alkyl or fluorinated aryl;

c = 0, or 1-4; and

n = 4 or more.

The fused polycyclic fluorinated acids have a  
structure of e.g. formula (XII), (XIIa) or (XIIb) (3 more given in  
the specification).

d = 0, 1 or 2;

R17-R20 = H, halogen, alkyl or alkoxy of 1-10 carbon atoms,  
Y', C(Rf')(Rf')OR21, R4Y', or OR4Y';

Y' = COE2, SO2E2, or sulfonimide;

R21 = H or acid-labile protecting group;

Rf' = 1-10C fluoroalkyl, or taken together are (CF2)e;



$e = 2-10$ ;  
 $R4 = \text{alkylene}$ ;  
 $E2 = \text{OH, halogen or OR7}$ ;  
 $R5 = \text{alkyl}$ ; and  
 $R21 = \text{group capable of forming or rearranging to tertiary cation, more typically 1-20C alkyl, and most typically t-butyl}$ .  
 At least one of  $R17-R20$  is  $Y'$ ,  $R4Y'$  or  $OR4Y'$ .  $R4$ ,  $R5$ , and  $R17-R20$  may optionally be substituted by halogen or ether oxygen.  
 The perfluoroalkyl sulfonic acid ethers have a structure of formula (XV).

$j, k = 0$  or more;  
 $(j+k) = 4-199$ ;  
 $Q1, Q2 = F$  or  $H$ ;  
 $Rf2 = F$  or 1-10C perfluoroalkyl optionally substituted by ether oxygen atom(s);  
 $h, g = 0$  or 1; and  
 $i = 0-3$ .

**POLYMERS - Preferred Polymers:** The semiconductive polymer comprises optionally substituted monomers chosen from thiophenes, pyrroles, anilines, fused polycyclic heteroaromatics, and polycyclic heteroaromatics.

The fluorinated acid polymer has a backbone chosen from polyolefins, polyacrylates, polymethacrylates, polyimides, polyamides, polyaramids, polyacrylamides, polystyrenes, and their copolymers.

The fluorinated acid polymer backbone is fluorinated.

The fluorinated acid polymer has fluorinated pendant groups chosen from ether sulfonates, ester sulfonates, and ether sulfonimides.

The fluorinated acid polymer comprises optionally substituted monomer(s) chosen from styrene sulfonic acids or sulfonated ether sulfones, trifluorostyrene sulfonates, sulfonimides, perfluoroalkyl sulfonate ethers, fused polycyclic fluorinated acids, and perfluoroalkyl sulfonic acid ethers.

The fluorinated acid polymer comprises polymeric acids comprising functional groups chosen from carboxylic, sulfonic, phosphoric, and phosphonic acid groups and/or sulfonimides.

The functional groups are present on the polymeric backbone, side chains, and/or pendant groups.

The pendant groups comprise siloxane sulfonic acid, or groups chosen from structures of formula:

$-\text{Og}-(\text{CF}(\text{Rf2})(\text{CF}-\text{Oh}))_i-\text{CF}_2\text{CF}_2\text{SO}_3\text{H}$  or of formula (XIV).  
 $\text{Rf2} = F$  or 1-10C perfluoroalkyl optionally substituted with ether oxygen atom(s);

$h, g = 0$  or 1;  
 $i = 0-3$ ;  
 $l, m = 0$  or more;  
 $(l+m) = 4-199$ ; and  
 $Q1, Q2 = F$  or  $H$ .

The fluorinated acid polymer is a colloid-forming polymeric acid and comprises a highly fluorinated sulfonic-acid (FSA) polymer.

The transparent conductor further comprises polymer comprising optionally substituted monomer(s) chosen from alkenyls, alkynyls, arylenes, and heteroarylenes.

The monomers are chosen from fluorene, oxadiazoles, thiadiazole, benzothiadiazoles, phenylenevinylenes,

phenyleneethynylenes, pyridine, diazines, and triazines.

## EXTENSION ABSTRACT:

EXAMPLE - A stock dispersion prepared by mixing Nafion (RTM: poly(perfluorethylene sulfonic acid)) (19.7753 g) with deionized water (162.119 g) and n-propanol (18.0151 g). The resulting dispersion contained 1.13% polymer. The dispersion (32.5063 g) was mixed with single wall carbon nanotube (0.0688 g) in a glass jug, and subjected to sonication for 15 minutes continuously. The glass jug was immersed in ice water contained in a tray to remove heat produced from intense cavitation. The carbon nanotubes formed a smooth, stable dispersion without any sign of sedimentation for many weeks. The dispersion was spin-coated to form a transparent film on a substrate for measurement of work function. The work function of the film was measured to be 6.2 eV.

FILE SEGMENT: CPI; EPI  
MANUAL CODE: CPI: A07-A05; A09-A03; A10-D06; A12-E01;  
E05-U  
EPI: U11-A08B; U14-H01E; X12-D02A1

L33 ANSWER 12 OF 18 WPIX COPYRIGHT 2010 THOMSON REUTERS on STN  
ACCESSION NUMBER: 2007-091376 [200709] WPIX  
DOC. NO. CPI: C2007-034846 [200709]  
TITLE: Article useful for removing contaminants e.g.  
bacteria from fluid e.g. water and air, comprises  
carbon nanotubes, at least one of  
which contains molecule or cluster attached to or  
located in it  
DERWENT CLASS: A97; B04; D15; D16; J01  
INVENTOR: COOPER C H; CUMMINGS A G; HONSINGER C P; STAROSTIN  
M Y; COOPER C; CUMMINGS A; HONSINGER C; STAROSTIN M  
PATENT ASSIGNEE: (SELD-N) SELDON TECHNOLOGIES LLC; (SELD-N) SELDON  
TECHNOLOGIES INC  
COUNTRY COUNT: 109

## PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
WO 2006115486	A1	20061102	(200709)*	EN	79	[22]
EP 1885647	A1	20080213	(200813)	EN		
IN 2007CN05299	A	20080627	(200852)	EN		
CN 101198542	A	20080611	(200855)	ZH		
JP 2008538531	T	20081030	(200874)	JA	45	

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2006115486 A1		WO 2005-US14025	
20050422			
CN 101198542 A		CN 2005-80050073	
20050422			
EP 1885647 A1		EP 2005-795204	
20050422			
EP 1885647 A1 PCT Application		WO 2005-US14025	
20050422			
IN 2007CN05299 A PCT Application		WO 2005-US14025	
20050422			
CN 101198542 A PCT Application		WO 2005-US14025	

20050422  
IN 2007CN05299 A  
JP 2008538531 T PCT Application  
20050422  
JP 2008538531 T  
20050422

IN 2007-CN5299 20071122  
WO 2005-US14025  
  
JP 2008-507613

## FILING DETAILS:

PATENT NO	KIND	PATENT NO
EP 1885647 A1	Based on	WO 2006115486 A
CN 101198542 A	Based on	WO 2006115486 A
JP 2008538531 T	Based on	WO 2006115486 A

PRIORITY APPLN. INFO: WO 2005-US14025

20050422

## INT. PATENT CLASSIF.:

MAIN: B82B0001-00  
IPC ORIGINAL: B01D0053-00 [I,A]; B01D0053-00 [I,C]; B01J0020-20 [I,A]; B01J0020-20 [I,C]; B82B0001-00 [I,A]; B82B0001-00 [I,C]; B82B0001-00 [I,A]; B82B0001-00 [I,C]; B82B0003-00 [I,A]; B82B0003-00 [I,C]; C01B0031-00 [I,C]; C01B0031-02 [I,A]; C02F0001-00 [I,A]; C02F0001-00 [I,C]; C02F0001-46 [I,A]; C02F0001-46 [I,C]; B01D0053-00; C02F0001-28D

ECLA: B01D0053-00; C02F0001-28D  
ICO: M02F0001:48; M02F0101:10B; M02F0103:08; Y01N0006:00

## JAP. PATENT CLASSIF.:

MAIN/SEC.: B01J0020-20 A; B82B0001-00; B82B0003-00;  
C01B0031-02 101 F; C02F0001-46 Z

## FTERM CLASSIF.:

3C082; 4D061; 4G066; 4G146; 4G066/AA04.B;  
4G066/AA04.C; 4G146/AA11; 4G146/AA12; 4G066/AA13.D;  
4G066/AA15.D; 4G066/AA16.D; 4G066/AA17.D;  
4G066/AA18.D; 4G066/AA20.D; 4G066/AA23.D;  
4G066/AA24.D; 4G066/AA25.D; 4G066/AA26.D;  
4G066/AA27.D; 4G066/AA28.D; 4G066/AA30.D;  
4G066/AA31.D; 4G066/AA41.D; 4G066/AA45.D;  
4G066/AA49.D; 4G066/AA51.D; 4G066/AA56.D;  
4G066/AA71.C; 4G066/AA72.C; 4G066/AB01.D;  
4G066/AB06.D; 4G146/AB07; 4G066/AB07.D;  
4G066/AB09.D; 4G066/AB18.D; 4G066/AC02.C;  
4G066/AC03.D; 4G066/AC11.C; 4G066/AC11.D;  
4G146/AD17; 4G146/AD31; 4G066/BA03; 4G066/BA16;  
4G066/BA20; 4G066/CA21; 4G066/CA22; 4G066/CA31;  
4G066/CA37; 4G066/CA38; 4G066/CA45; 4G066/CA54;  
4G146/CB10; 4G146/CB12; 4G146/CB16; 4G146/CB17;  
4G146/CB19; 4G146/CB22; 4G146/CB32; 4G146/CB35;  
4G146/CB37; 4D061/DA01; 4G066/DA01; 4G066/DA07;  
4D061/DA08; 4D061/DB03; 4D061/DB13; 4D061/DB20;  
4D061/EA01; 4D061/EB04; 4D061/EB09; 4D061/EB20;  
4D061/EB29; 4G066/FA14; 4G066/FA31

## BASIC ABSTRACT:

WO 2006115486 A1 UPAB: 20090918

NOVELTY - An article comprises carbon nanotubes, at least one of which contains molecule or cluster attached to or located in it.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for preparation of nanomesh material comprising carbon nanotubes, involving exposing the carbon nanotubes to at least one chemical, radioactive or mechanical treatment; rinsing the carbon nanotubes in at least one solvent chosen from aqueous, inorganic, and organic solvents; forming a suspension of carbon

nanotubes by mixing the carbon nanotubes with at least one solvent chosen from aqueous, inorganic, and organic solvents, the suspension optionally containing fibers and/or particles; and depositing the suspension onto a porous substrate to form a nanomesh layer of carbon nanotubes on the porous substrate.

USE - For removing contaminants including bacteria (such as anthrax, typhus, or cholera); viruses (such as smallpox and hepatitis); oocysts; spores; molds; conforms; parasites; pollens; fungi; biological molecules (such as DNA, RNA, and natural organic molecules); chemical compound (such as natural and synthetic organic molecules (e.g. toxins, endotoxins, proteins, enzymes, pesticides, and herbicides), inorganic contaminants (e.g. heavy metals, cleaning agents, fertilizers and inorganic poisons), pharmaceuticals (e.g. medicines, solvents and reagents) and ions (e.g. seawater and airborne particles)); atom or ion (such as elements: antimony, arsenic, aluminum, selenium, hydrogen, lithium, boron, carbon, oxygen, calcium, magnesium, sulfur, chlorine, niobium, scandium, titanium, vanadium, chromium, manganese, iron, cobalt, nickel, copper, zinc, gallium, germanium, bromine, strontium, yttrium, zirconium, molybdenum, rhodium, palladium, iodine, silver, cadmium, indium, tin, cesium, barium, lanthanum, tantalum, beryllium, copper, fluoride, mercury, tungsten, iridium, hafnium, rhenium, osmium, platinum, gold, mercury, thallium, lead, bismuth, polonium, radon, radium, thorium, uranium, plutonium, and radon); charged contaminants (such as ions (e.g. sodium, chloride, potassium, calcium, magnesium, sulfate, bicarbonate, manganese, iron, copper, mercury, gold, silver, platinum, lead, arsenic, uranium, or palladium) comprising the salt in sea and brackish waters, or ions found in fresh water, wastewater and effluent streams; other contaminants such as pathogens, viruses, microbiological organisms, DNA, RNA, natural organic molecules, molds, fungi, natural and synthetic toxins, heavy metals, endotoxins, proteins, prions, and enzymes; from a fluid including liquid (such as water, petroleum and its byproduct, biological fluid, foodstuff, alcoholic beverage, and pharmaceutical); or gas (such as air, industrial gas (e.g. argon, nitrogen, helium, ammonia, and carbon dioxide)), and smoke from a vehicle, smoke stack, chimney, or cigarette). (All claimed).

ADVANTAGE - The article effectively removes contaminants. The removal of biological agents is independent of the removal of non-biological particles and filter's resistance to airflow.

#### TECHNOLOGY FOCUS:

BIOLOGY - Preferred Components: At least one cluster comprises microorganism, tissue cell, bacteria or nanobacteria. The biological material or its derivative is chosen from silk fiber, cotton fiber, wool fiber, flax fiber, feather fibers, and cellulose fiber extracted from wood, legumes or algae.

CERAMICS AND GLASS - Preferred Components: The ceramic material is chosen from boron carbide, boron nitride, boron oxide, spinel, garnet, lanthanum fluoride, calcium fluoride, silicon carbide, carbon and its allotropes, glass, quartz, alumina, aluminum nitride, aluminum hydroxide, zirconium oxide, zirconium carbide, zirconium boride, zirconium nitride, hafnium boride, thorium oxide, yttrium oxide, magnesium oxide, cordierite, mullite, silicon nitride, ferrite, sapphire, steatite, titanium carbide, titanium nitride, titanium oxide, titanium boride, zirconium boride and/or zirconium nitride.

ELECTRONICS - Preferred Voltage: The voltage is AC voltage having a frequency and amplitude signal that is sufficient to disrupt the Debye atmosphere surrounding at least one charged contaminant in the fluid. The DC voltage differential is greater than 0 - 200 kV. The AC voltage peak-to-peak amplitude is greater than 0 - 200 kV. The AC frequency is 1 millihertz - 1 terahertz.

INORGANIC CHEMISTRY - Preferred Article: The article further comprises a ridged or flexible, porous support substrate. The carbon nanotubes are in the form of an assembled

nanomesh connected or attached to other carbon nanotubes, to fibers and/or to particles. A majority of the carbon nanotubes are dispersed from, and not connected or attached to other carbon nanotubes, to fibers, or to particles. The carbon nanotube is chosen from single walled, double walled or multi-walled carbon nanotubes that have either a nested or non-nested morphology of nano-horns, nano-spirals, nano-springs, dendrites, trees, spider nanotube structures, nanotube Y-junctions, and bamboo morphology or multi-stranded helices, multi-stranded nested helices, or nested helices. The assembled nanomesh comprises carbon nanotubes and glass fibers. The article further comprises multiple distinct layers of carbon nanotubes, where each layer reduces the amount of a different contaminant, there is a voltage differential between at least two of the layers, either AC voltages and/or DC voltages are applied, to at least one of the layers of carbon nanotubes. At least one of the multiple layers is sufficient to desalinate water and at least one other layer is sufficient to remove, separate, immobilize and/or destroy other contaminants. The article further comprises at least one fiber chosen from glass, quartz, alumina, and aluminum hydroxide.

Preferred Components: At least one molecule or cluster comprises an inorganic compound containing at least one metal atom chosen from: lithium, sodium, magnesium, aluminum, potassium, calcium, scandium, titanium, vanadium, chromium, manganese, iron, cobalt, nickel, copper, zinc, gallium, rubidium, strontium, yttrium, zirconium, niobium, molybdenum, rhodium, palladium, silver, indium, tin, cesium, barium, lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, hafnium, tantalum, tungsten, rhenium, osmium, iridium, platinum, gold, bismuth and at least one nonmetal atom chosen from: hydrogen, boron, carbon, nitrogen, oxygen, fluorine, silicon, phosphorus, sulfur, chlorine, bromine, antimony and/or iodine. The cluster comprises quantum dots. The porous support substrate comprises a material chosen from ceramic, carbon or carbon based material, metal or alloy, nonmetal and plastic, and fibrous materials (preferably woven and/or non-woven). The metallic material is chosen from aluminum, boron, copper, cobalt, gold, platinum, palladium, silicon, steel, iridium, indium, iron, rhodium, palladium, gallium, germanium, tin, titanium, tungsten, nickel, niobium, magnesium, manganese, molybdenum, silver, zirconium, yttrium, their oxide, hydride, hydroxide and their alloy. The fiber is at least one metallic oxide or metallic hydroxide nanowire. The metal in the metal coated or decorated glass fibers comprises iron hydroxide. The fibers comprise metal, metal oxide, or metal hydroxide coated or decorated glass fibers having a diameter of 0.1 - 5 microns.

Preferred Method: The chemical treatment involves treatment with an oxidizer. The radiative treatment involves at least one of microwave, E-beam, and heat treatment. The mechanical treatment involves at least one of sonication and stirring. The treatment of first step creates defects. The carbon nanotubes comprising at least one functional group attach to at least one of the defects or to a non-defective surface of the carbon nanotubes. The attachment of functional chemical groups to the carbon nanotubes is sufficient to adjust the zeta potential of the resulting functionalized carbon nanotube. The carbon nanotubes are

multi-walled and have a length ranging of 0.1 microns - 100 nm, and a diameter of 1 - 300 nm. The suspension is deposited by differential pressure deposition onto a carbon-based substrate. The preparation further involves forming at least one additional suspension having a ratio of functionalized carbon nanotubes to fibers different from the first suspension; and forming at least two alternating layers of nanomesh, where at least one layer is formed from the first suspension and at least one additional layer is formed from the additional suspension.

**ORGANIC CHEMISTRY - Preferred Components:** At least one molecule or cluster comprises an organic compound containing protein, carbohydrate, polymer, aromatic or aliphatic alcohol, and nucleic acid. At least one molecule or cluster comprises an organic compound containing chemical group chosen from carboxyl, amine, arene, nitrile, amide, alkane, alkene, alkyne, alcohol, ether, ester, aldehyde, ketone, polyamide, polyamphiphile, diazonium salt, metal salt, pyrenyl, thiol, thioether, sulphydryl and/or silane.

**Preferred Reactants:** The oxidizer is nitric, sulfuric, hydrochloric or hydrofluoric acids, potassium permanganate and/or hydrogen peroxide sufficient to attach at least one functional group (preferably carboxyl, amine or polyamine) to a surface of the carbon nanotube. The solvent is water and/or alcohol.

**POLYMERS - Preferred Components:** The fiber is selected from polymeric material including single or multi-component polymer such as nylon, acrylic, methacrylic, epoxy, silicone rubber, polypropylene, polyethylene, polyurethane, polystyrene, polycarbonate, aramid, polychloroprene, polybutylene terephthalate, poly-paraphenylene terephthalamide, poly(para-phenylene terephthalamide) and polyester ester ketone, polyester, polytetrafluoroethylene, polyvinylchloride, polyvinyl acetate, viton fluoroelastomer, polymethyl methacrylate, and/or polyacrylonitrile. The fibers have a diameter of 1 nm - 1 cm, and possess aspect ratios (length/diameter) of 2 - 109.

#### EXTENSION ABSTRACT:

**EXAMPLE -** A 64 layer, flat nanomesh device was made from: purified, functionalized carbon nanotubes; glass fibers measuring 100 - 500 nm in diameter and 300-500 microns in length; a solution of polyvinyl alcohol (0.0125 weight%) with a molecular weight of 20000 g in distilled water; 1.5 oz/yard cellulose filter paper as an insulator; a non-woven, fused, 0.5 oz/yard<sup>2</sup> conductive carbon tissue paper substrate; silver-embedded conductive and insulating epoxies; a plastic, non-conductive housing; and a power supply to supply 1.5V DC across each neighboring pair of conducting nanomesh layers. The functionalized nanotubes (25 mg) (carboxylated through a nitric acid wash procedure) and glass fiber (50 mg) were suspended in distilled water (4 liters) containing a 0.0125% concentration of polyvinyl alcohol. The suspension was stirred for 3 minutes and was deposited on the sheet of 0.5 oz/yard<sup>2</sup> carbon tissue paper. Four 2' diameter discs were cut from sheet, completing 4 layers of the 64 layer. An electrical lead was attached to each conductive nanomesh layer. All conductive nanomesh layers were sandwiched between insulating layers and these 'sandwiches' were then stacked with the electrical leads. The electrical leads were bundled and routed through the plastic housing wall to the power supply and the entire assembly was sealed. A static retention test was performed by flowing 1 liter of saline solution through the device with no electrical charge or

stimulation imposed. The filtrate was tested for salt content and it was found to have lost approximately 13 mg of salt. Therefore the inventive device in static mode reduced the salinity by approximately 1.3%. This reduction amounted to 0.42 g of salt removed per gram of carbon nanotubes in the inventive device. A dynamic retention test was performed, wherein a differential DC voltage of 4 mV was applied to each of 16 neighboring pairs of conductive nanomesh layers. A saline challenge solution of sodium chloride (1 g) dissolved in distilled water (1000 ml) was used to test the efficacy of the device. In one pass through the device, 1.6% of the salt was removed. This removal rate was equivalent to 0.52 g of salt per g of carbon nanotubes. This represented a 23% increase in salt removal over the static device, showing that even a very weak voltage enhanced the removal of salt ions from a water solution, thus demonstrating the nano-electric removal effect. Further enhancement of the salt removal was achieved as the DC voltages were increased and AC signals, which disrupt the Debye atmosphere, were imposed.

FILE SEGMENT: CPI  
 MANUAL CODE: CPI: A12-W11F; B04-E01; B04-F09; B04-F10; B04-F11; B04-L01; B04-N04; B05-A01A; B05-A01B; B05-A02; B05-A03A; B05-A03B; B05-B02B; B05-B02C; B05-C06; B05-C07; B05-C08; B05-U03; B11-B04; B11-C12; D04-B04; D04-B05; D04-B06; D04-B07; D05-H13; J01-D01; J01-E02B

L33 ANSWER 13 OF 18 WPIX COPYRIGHT 2010 THOMSON REUTERS ON STN  
 ACCESSION NUMBER: 2006-688841 [200671] WPIX  
 CROSS REFERENCE: 2006-708880; 2009-R50900; 2009-S19642  
 DOC. NO. CPI: C2006-210070 [200671]  
 TITLE: Rapidly functionalizing of nanomaterial to form nanomaterial composite comprises performing functionalization reaction by subjecting nanomaterial and functionalizing reactant to microwave conditions  
 DERWENT CLASS: A14; A23; A25; A97; E36; F01  
 INVENTOR: IQBAL Z; MITRA S  
 PATENT ASSIGNEE: (IQBA-I) IQBAL Z; (MITR-I) MITRA S; (NEWJ-N) NEW JERSEY INST TECHNOLOGY  
 COUNTRY COUNT: 1

## PATENT INFORMATION:

PATENT NO	KIND DATE	WEEK	LA	PG	MAIN IPC
US 20060210466	A1 20060921	(200671)*	EN	23	[18]
US 7754054	B2 20100713	(201048)	EN		

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 20060210466	A1 Provisional	US 2005-660802P	
20050311			
US 20060210466	A1	US 2006-374499	20060313
US 7754054	B2 Provisional	US 2005-660802P	
20050311			
US 7754054	B2 Provisional	US 2006-767564P	20060110
US 7754054	B2 Provisional	US 2006-767565P	20060110
US 7754054	B2	US 2006-374499	20060313

PRIORITY APPLN. INFO: US 2006-374499 20060313  
US 2005-660802P 20050311  
US 2006-767564P 20060110  
US 2006-767565P 20060110

## INT. PATENT CLASSIF.:

## IPC ORIGINAL:

D01F0009-12 [I,A]; D01F0009-12 [I,C]; A62D0003-00  
[I,A]; A62D0003-00 [I,C]; C01B0031-00 [I,A];  
C01B0031-00 [I,C]; C07C0001-00 [I,A]; C07C0001-00  
[I,C]; C07F0001-00 [I,A]; C07F0001-00 [I,C]  
423/447.100

## USCLASS NCLM:

## BASIC ABSTRACT:

US 20060210466 A1 UPAB: 20061103

NOVELTY - A nanomaterial is rapidly functionalized by performing a functionalization reaction comprising subjecting the nanomaterial and functionalizing reactant to microwave conditions.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a method for synthesizing a nanomaterial composite comprising providing a nanomaterial; and adding a target material consisting of ceramic compound, metal, and/or polymer to the nanomaterial, in which the target material and nanomaterial combination is exposed to microwave conditions to form nanomaterial composite.

USE - Used for rapidly functionalizing of nanomaterial to form nanomaterial composite (claimed).

ADVANTAGE - The invention provides for fast functionalization and solubilization of SWNTs and their composites.

DESCRIPTION OF DRAWINGS - The figure is a graph which compares a spectra of pristine SWNTs, nitric acid -treated SWNTs with microwave, and 2,6-dinitroaniline functionalized SWNTs.

## TECHNOLOGY FOCUS:

CHEMICAL ENGINEERING - Preferred Methods: The functionalization reaction is consisting of carboxylation, sulfonation, esterification, thiolation, carbene addition, nitration, nucleophilic cyclopropanation, bromination, fluorination, diels alder reaction, amidation, cycloaddition, polymerization, adsorption of polymers, or addition of biological molecules and enzymes. It further comprises covalent bonding, amidation of the nanomaterial, and 1,3-dipolar cycloaddition of the nanomaterial. The reaction time of the functionalization reaction is 1 second to 30 minutes. The functionalization reaction further comprises subjecting the nanomaterial to an acidic treatment.

Preferred Materials: The nanomaterial is consisting of single wall carbon nanotubes (SWNTs), multiwall carbon nanotubes, carbon nanohorns, fullerenes, nano onions, or nanocomposites, preferably SWNT. It is non-soluble prior to functionalization. The functionalization reaction comprises a solubilizing reactant consisting of aqueous, organic, polar, nonpolar, or hydrogen bonding solvents. The acidic treatment comprises a 1:1 mixture of nitric acid and sulfuric acid in water.

INORGANIC CHEMISTRY - Preferred Materials: The ceramic compound comprises carbides, borides, nitrides, suicides, barium titanate, bismuth strontium calcium copper oxide, boron carbide, boron nitride, aluminum silicates, earthenware, Ferrite, lead zirconate titanate, magnesium diboride, porcelain, silicon carbide, silicon nitride, Steatite, uranium oxide, yttrium barium copper oxide, zinc oxide, and/or zirconia. The metal comprises a salt consisting of lithium aluminum hydride, lithium boron hydride, or cadmium sulfide.



POLYMERS - Preferred Compounds: The polymer is consisting of methyl methacrylate, polyvinyl pyrrolidone, polyurethane, or polyamide.

FILE SEGMENT: CPI  
MANUAL CODE: CPI: A12-W11; E05-U; E11-A01; E11-F;  
E31-A04; E31-H05; E31-N05A; E31-P02D; E31-P06C;  
E31-P06D; E31-Q02; E31-Q03; E35; F01-D09A

L33 ANSWER 14 OF 18 WPIX COPYRIGHT 2010 THOMSON REUTERS on STN  
ACCESSION NUMBER: 2006-567343 [200658] WPIX  
CROSS REFERENCE: 2008-L68468  
DOC. NO. CPI: C2006-176213 [200658]  
DOC. NO. NON-CPI: N2006-455818 [200658]  
TITLE: Forming guanidine group on carbon  
nanotubes, comprises forming carboxyl group  
on carbon nanotubes, and  
forming guanidine group on carboxyl group  
DERWENT CLASS: A18; A26; A82; E19; L02; L03; Q68; V05  
INVENTOR: LEE H S  
PATENT ASSIGNEE: (SMSU-C) SAMSUNG ELECTRO-MECHANICS CO; (LEE-H-I) LEE  
H S  
COUNTRY COUNT: 3

## PATENT INFORMATION:

PATENT NO	KIND DATE	WEEK	LA	PG	MAIN IPC
US 20060165587	A1 20060727	(200658)*	EN	19[5]	
JP 2006206568	A 20060810	(200658)	JA	26	
KR 2006086693	A 20060801	(200705)	KO		
US 7261924	B2 20070828	(200757)	EN		
JP 4242366	B2 20090325	(200922)	JA	25	

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 20060165587	A1	US 2005-126375	
20050511			
KR 2006086693	A	KR 2005-7585	20050127
JP 2006206568	A	JP 2005-142928	
20050516			
JP 4242366	B2	JP 2005-142928	
20050516			

## FILING DETAILS:

PATENT NO	KIND	PATENT NO
JP 4242366	B2	Previous Publ JP 2006206568 A

PRIORITY APPLN. INFO: KR 2005-7585 20050127

## INT. PATENT CLASSIF.:

IPC ORIGINAL: B05D0001-00 [I,A]; B05D0001-00 [I,C]; B82B0003-00 [I,C]; B82B0003-00 [I,A]; B82B0003-00 [I,A]; B82B0003-00 [I,C]; C01B0031-00 [I,C]; C01B0031-00 [I,C]; C01B0031-00 [N,C]; C01B0031-00 [I,C]; C01B0031-02 [I,A]; C01B0031-02 [N,A]; C01B0031-02 [I,A]; C07C0277-00 [I,C]; C07C0277-00 [I,C]; C07C0277-08 [I,A]; C07C0279-00 [I,C];

C07C0279-00 [I,C]; C07C0279-24 [I,A]; D01F0009-12 [I,A]; D01F0009-12 [I,C]  
D01F0011-12; D01F0011-14  
Y01N0006:00  
USCLASS NCLM: 423/447.100; 427/407.100  
NCLS: 427/372.200; 427/402.000; 977/847.000  
JAP. PATENT CLASSIF.:  
MAIN/SEC.: B82B0003-00; C01B0031-02 101 F; C07C0277-08;  
C07C0279-24  
C07C0277-08  
MAIN:  
SECONDARY: B82B0003-00; C01B0031-02 101 F; C07C0279-24  
FTERM CLASSIF.: 3C082; 4G146; 4H006; 4H006/AA02; 4G146/AA11;  
4G146/AA17; 4G146/AA26; 4H006/AC46; 4H006/AC59;  
4G146/AD29; 4G146/BA04; 4H006/BC10; 4H006/BC19;  
4H006/BC31; 4H006/BE02; 4H006/BE03; 4G146/CB11;  
4G146/CB14; 4G146/CB22

## BASIC ABSTRACT:

US 20060165587 A1 UPAB: 20090407

NOVELTY - Forming a guanidine group on carbon nanotubes comprises forming a carboxyl group on carbon nanotubes; and forming a guanidine group on the carboxyl group.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for:

(1) carbon nanotube comprising at least one guanidine moiety of formula  $-(C=O)-NH-(C=NH)-NH_2$ ;

(2) attaching carbon nanotubes having guanidine groups to a substrate comprising coating a substrate with a polymer having crown ether attached to it; drying the polymer layer having crown ether formed on the substrate to be semi-dried; and coating the semi-dried polymer layer with a solution including carbon nanotubes having guanidine groups dispersed in it; and

(3) substrate having carbon nanotubes attached to it comprising a substrate; a polymer layer having crown ether attached to it; and a coating layer of carbon nanotubes having bonded moiety or moieties

USE - The invention is useful for forming a guanidine group on carbon nanotubes useful for attachment to a substrate. The coated layer with attached nanotubes may be used in field emission devices or other electronic devices.

ADVANTAGE - The invention improves the dispersibility of carbon nanotubes. In the cases where a metal cation is present in the solution, the chelating of the carboxyl group or amine group of the CNTs with the metal cation is eliminated. It allows carbon nanotubes to be uniformly dispersed in the solvent that is able to react with the guanidine group to form a hydrogen bond, even without an additional dispersant.

DESCRIPTION OF DRAWINGS - The figure shows a molecular model photograph showing the molecular recognition of 18-crown-6-ether and guanidine. TECHNOLOGY FOCUS:

ORGANIC CHEMISTRY - Preparation: The carboxyl group is formed by adding the carbon nanotubes to a mixture of nitric acid and sulfuric acid mixed at a volume ratio of 3:1, and then reacting for 22-26 hours with sonification at 50-60degreesC. The guanidine group can be formed by adding the carboxylated-carbon nanotubes, a compound having a guanidine group, and a coupling agent (which acts as a catalyst) to a solvent, and then reacting at 25-50degreesC for 6-10 hours in an inert atmosphere.

Preferred Methods: Attaching carbon nanotubes having guanidine groups to a substrate comprises reacting a polymer having crown ether attached to it with carbon nanotubes having guanidine groups to prepare a polymer having a combination of crown ether and carbon nanotubes having guanidine groups; and coating a substrate with the polymer. The polymer having crown

ether attached to it is formed by dispersing crown ether (10-20 parts by weight based on 100 parts by weight of the polymer) in a solvent, and then stirring the crown ether and the polymer at room temperature for 2-5 hours. The polymer having a combination of crown ether and carbon nanotubes having guanidine groups is formed by adding the carbon nanotubes having guanidine groups at ratio of 1/100-1/500 based on the weight of the polymer having crown ether attached to it to a solvent, and reacting at room temperature for 20-40 minutes. Attaching carbon nanotubes having guanidine groups to a substrate can also comprise dipping an anodized aluminum oxide substrate is installed as a cathode into a solution including carbon nanotubes having guanidine groups dispersed in it; and performing electrophoresis or electroplating.

**Preferred Components:** The compound having the guanidine group is guanidine, cyanoguanidine, or guanidine thiocyanide. The coupling agent is 1-(3-dimethylamino propyl)-3-ethyl-carboimide hydrochloride (EDC), dicyclohexylcarbodiimide (DCC), oxalic acid, or oxalic acid chloride. The coupling agent is used in 0.4-0.5 equivalents based on 1 equivalent of the carbon nanotubes having the carboxyl group. The solvent is pyridine or pyrrolidine. The crown ether is 18-member crown ether, dibenzo-18-crown-6-ether, or dibenzo-24-member crown ether. The substrate having carbon nanotubes attached to it comprises anodized aluminum oxide substrate; and carbon nanotubes having bonded moiety or moieties inserted into pores of the substrate.

**Preferred Parameters:** The electrophoresis or electroplating is performed using direct current of 20-50 V for 10-20 min.

**Preferred Properties:** The coating is performed to a thickness of 200-1000 microns. The film has a thickness of 1-2 mm.

**POLYMERS - Preferred Polymer:** The polymer is polyacetylenes, polyphenylenes, polyanilines, polythiophenes, poly pyrroles, mixtures of poly(3,4-ethylenedioxythiophenes) and poly(styrene sulfonic acids) (PEDOT:PSS), poly(4-vinylphenols), polymethyl methacrylates, polystyrenes, or their derivatives. The polymer layer is a coating layer or a film layer.

FILE SEGMENT:	CPI; GMPI; EPI
MANUAL CODE:	CPI: A12-B01; E05-U04; E11-A02; E11-E03; E11-F07; L02-H04B; L03-C02A; L03-G05D; N05-D; N05-E03; N07-D08 EPI: V05-L01A3A

L33 ANSWER 15 OF 18	WPIX COPYRIGHT 2010	THOMSON REUTERS on STN
ACCESSION NUMBER:	2006-144733 [200615]	WPIX
DOC. NO. CPI:	C2006-048984 [200615]	
DOC. NO. NON-CPI:	N2006-125192 [200615]	
TITLE:	Field-effect transistor used for display device, has source/drain electrodes each having conductive portion containing metal, and organic conductive material layer, and organic semiconductor layer having channel region between electrodes	
DERWENT CLASS:	A85; E13; L03; U12	
INVENTOR:	NOMOTO K	
PATENT ASSIGNEE:	(NOMO-I) NOMOTO K; (SONY-C) SONY CORP	
COUNTRY COUNT:	5	

PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
US 20060027860	A1	20060209	(200615)*	EN	21[9]	
JP 2006049577	A	20060216	(200615)	JA	22	
KR 2006049062	A	20060518	(200673)	KO		
CN 1905230	A	20070131	(200735)	ZH		
TW 292633	B1	20080111	(200908)	ZH		
TW 2006025707	A	20060716	(200951)	ZH		
CN 100533802	C	20090826	(200965)	ZH		

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 20060027860	A1	US 2005-186129	
20050720			
JP 2006049577 A		JP 2004-228573	
20040804			
TW 292633 B1		TW 2005-123935	
20050714			
TW 2006025707 A		TW 2005-123935	
20050714			
CN 1905230 A		CN 2005-10088403	
20050726			
KR 2006049062 A		KR 2005-70919 20050863	
CN 100533802 C		CN 2005-10088403	
20050726			

PRIORITY APPLN. INFO: JP 2004-228573

20040804

INT. PATENT CLASSIF.:

MAIN:

H01L0051-00

IPC ORIGINAL:

H01L0021-02 [I,C]; H01L0021-28 [I,A]; H01L0029-40 [I,C]; H01L0029-417 [I,A]; H01L0029-423 [I,A]; H01L0029-49 [I,A]; H01L0029-66 [I,C]; H01L0029-76 [I,A]; H01L0029-786 [I,A]; H01L0051-05 [I,A]; H01L0051-05 [I,A]; H01L0051-05 [I,A]; H01L0051-05 [I,C]; H01L0051-05 [I,C]; H01L0051-05 [I,C]

IPC RECLASSIF.:

H01L0029-66 [I,C]; H01L0029-772 [I,A]; H01L0051-00 [I,A]; H01L0051-00 [I,C]

ECLA:

H01L0051-00A8; H01L0051-05B2B4; H01L0051-05B2B6

ICO:

T01L0051:00M6D; T01L0051:30H4

USCLASS NCLM:

257/327.000

NCLS:

257/E51.049

JAP. PATENT CLASSIF.:

MAIN/SEC.:

H01L0021-28 301 B; H01L0029-28; H01L0029-28 100 A; H01L0029-28 220 A; H01L0029-50 M; H01L0029-58 G; H01L0029-78 616 U; H01L0029-78 616 V; H01L0029-78 618 B

FTERM CLASSIF.:

4M104; 5F096; 5F110; 4M104/AA03; 5F110/AA03;  
 4M104/AA09; 4M104/BB02; 4M104/BB04; 4M104/BB05;  
 4M104/BB08; 4M104/BB13; 4M104/BB14; 4M104/BB16;  
 4M104/BB17; 4M104/BB18; 4M104/BB36; 4M104/CC01;  
 5F110/CC01; 5F110/CC03; 4M104/CC05; 5F110/CC05;  
 5F110/CC07; 5F110/DD01; 5F110/DD02; 5F110/DD03;  
 5F110/DD05; 5F110/DD13; 4M104/DD34; 4M104/DD37;  
 4M104/DD38; 4M104/DD43; 4M104/DD51; 4M104/DD52;  
 4M104/DD53; 4M104/DD68; 5F110/EE01; 5F110/EE02;  
 4M104/EE03; 5F110/EE03; 5F110/EE04; 5F110/EE06;  
 5F110/EE07; 4M104/EE15; 4M104/EE16; 4M104/EE17;

4M104/EE18; 5F110/FF01; 5F110/FF02; 5F110/FF03;  
 5F110/FF04; 5F110/FF27; 5F110/FF28; 5F110/FF29;  
 5F110/GG05; 4M104/GG20; 5F110/GG42; 4M104/HH15;  
 5F110/HK01; 5F110/HK02; 5F110/HK03; 5F110/HK04;  
 5F110/HK06; 5F110/HK07; 5F110/HK21; 5F110/HK32;  
 5F110/HK33; 5F110/HK34

## BASIC ABSTRACT:

US 20060027860 A1 UPAB: 20060302

NOVELTY - A field-effect transistor has gate electrode (12), gate insulating layer (13), source/drain electrodes (21), and organic semiconductor layer (14) having channel region (15) between electrodes (21). Each electrode (21) has conductive portion (22) having metal, and organic conductive material layer (23) partially covering portion (22) and is doped with dopant. Region (15) and portion (22) are electrically connected through layer (23).

USE - E.g. thin-film transistor used for display devices and electronic devices.

ADVANTAGE - The field-effect transistor has high electrical conductivity.

DESCRIPTION OF DRAWINGS - The figure shows the sectional view of the field-effect transistor.

base (11)  
 gate electrode (12)  
 gate insulating layer (13)  
 organic semiconductor layer (14)  
 channel region (15)  
 source/drain electrodes (21)  
 conductive portion (22)  
 organic conductive material layer (23)

TECHNOLOGY FOCUS:

ELECTRONICS - Preferred Component: The gate electrode, gate insulating film, source/drain electrodes and organic semiconductor layer are provided in order on a base (11). Preferred Property: The conductivity of the organic semiconductor layer is same as the conductivity of organic conductive material layer.

INORGANIC CHEMISTRY - Preferred Material: The conductive portion contains copper, silver, aluminum, fine gold particles, fine platinum particles or fine palladium particles.

POLYMERS - Preferred Material: The organic conductive material layer is obtained by doping polythiophene, polypyrrole, polyaniline, polyacetylene, polyphenylene, polyfuran, polyselenophene, polyisothianaphthene, polyphenylene sulfide, polyphenylene vinylene, polythienylene vinylene, polynaphthalene, polyanthracene, polypyrrene, polyazulene, phthalocyanine, pentacene, merocyanine and/or polyethylene dioxy thiophene with iodine, perchloric acid, hydrochloric acid, sulfuric acid, nitric acid, phosphoric acid, tetrafluoro boric acid, arsenic pentafluoride, hexafluoro phosphoric acid, alkyl sulfonic acid, perfluoro alkyl sulfonic acid, polyacrylic acid, polystyrene sulfonic acid and/or dodecyl benzene sulfonic acid. The organic conductive material layer contains carbon nanotube and/or fullerene.

FILE SEGMENT:

MANUAL CODE:

CPI; EPI  
 CPI: A10-E01; A12-E11A; E05-U02; E05-U03;  
 E10-A09B4; E31-B03A; E31-B03D; E31-C; E31-F04;  
 E31-H05; E31-K05A; E31-K07; E31-L; E31-Q02;  
 L04-E01A  
 EPI: U12-B03C; U12-D02A; U12-E02

September 20, 2010

10/593,918

62

ACCESSION NUMBER: 2004-059065 [200406] WPIX  
 DOC. NO. CPI: C2004-024131 [200406]  
 DOC. NO. NON-CPI: N2004-047790 [200406]  
 TITLE: Preparation of carbon molecular sieve as  
 sensor, comprises contacting composition having  
 polymerizable compounds with template having pores,  
 forming polymeric material in pores, and heating  
 template and polymeric material  
 E36; J01; J04; J06; L03; X16  
 DERWENT CLASS: CHO G U; CHO G W; CHOI S J; JOO S H; RYOO R  
 INVENTOR: (CHOI-I) CHOI S J; (JOOS-I) JOO S H; (RYOO-I) RYOO  
 PATENT ASSIGNEE: R; (KOOC-C) KOREA OCEAN RES&DEV INST  
 COUNTRY COUNT: 2

## PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
US 20020187896	A1	20021212	(200406)*	EN	12[11]	
<--						
KR 2002084371	A	20021107	(200406)	KO		
<--						
KR 408977	B	20031206	(200424)	KO		
<--						

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
US 20020187896 A1		US 2001-4350	20011025
KR 2002084371 A		KR 2001-23540	20010430
KR 408977 B		KR 2001-23540	20010430

## FILING DETAILS:

PATENT NO	KIND	PATENT NO
KR 408977 B	Previous Publ	KR 2002084371 A

PRIORITY APPLN. INFO: KR 2001-23540 20010430  
 INT. PATENT CLASSIF.:

MAIN: A23J0001-04  
 IPC RECLASSIF.: A23J0001-00 [I,C]; A23J0001-04 [I,A]; B01J0020-20  
 [I,A]; B01J0020-20 [I,C]; B82B0003-00 [I,A];  
 B82B0003-00 [I,C]; C01B0003-00 [I,A]; C01B0003-00  
 [I,C]; C01B0031-00 [I,C]; C01B0031-02  
 [I,A]; H01M0004-96 [I,A]; H01M0004-96 [I,C]  
 ECLA: B01J0020-20; C01B0003-00D2C; C01B0031-02  
 ICO: Y01N0006:00; Y02E0060:32F2; Y02E0060:50  
 USCLASS NCLM: 502/418.000  
 NCLS: 095/116.000; 423/445.00R

## BASIC ABSTRACT:

US 20020187896 A1 UPAB: 20050527

NOVELTY - Template having internal structure defining pores is  
 contacted with composition comprising polymerizable compounds having carbons  
 such that template absorbs and retains composition in pores. The polymerizable  
 compound is polymerized, and polymeric material is formed, and template and  
 polymeric material are heated to thermally decompose polymeric material, and  
 template is removed, to obtain carbon molecular sieve.

DETAILED DESCRIPTION - Template having internal structure defining pores is provided, and composition comprising polymerizable compounds having carbons is contacted with the template such that the template absorbs and retains the composition in the pores. The polymerizable compound retained in the pores is polymerized, and polymeric material having carbons is formed which is retained in the pores of the template. The template and the retained polymeric material are subjected to heating to thermally decompose the polymeric material, and remove the non-carbon elements.

Subsequently the template is removed, and carbon molecular sieve is obtained.

INDEPENDENT CLAIMS are included for the following:

- (1) carbon molecular sieve; and
- (2) method of storing hydrogen.

USE - For preparing carbon molecular sieve used as adsorbent for organic materials, sensors, electrodes, and materials for fuel cells and hydrogen storage for hydrogen battery.

ADVANTAGE - The carbon molecular sieve having efficient hydrogen adsorption property and activity for oxygen reduction is efficiently produced. TECHNOLOGY FOCUS:

INORGANIC CHEMISTRY - Preferred Process: The template removal process involves contacting the template with an acid or base. The acid is hydrofluoric acid, and the base is sodium hydroxide, and the acid and base are provided in aqueous or alcoholic solutions. The heating of polymeric material is performed at 400-1400degreesC.

Preferred Template: The template comprises mesoporous silica molecular sieve comprising aluminum. The pores contained in the template are 1-dimensional pores, which are interconnected with each other and have size of 1-50 nm, preferably 2-20 nm. The template comprises SBA-15, Aluminum SBA-15, SBA-3 or Aluminum SBA-3.

Preferred Material: The carbons atom of the carbon molecular sieve forms nano-lines or nano-tubes having uniform hexagonal structure, and pores having two uniform diameters.

ORGANIC CHEMISTRY - Preferred Composition: The polymerizable compound comprises carbohydrate, and non-carbohydrate precursor of polymer. The composition further comprises an acid chosen from sulfuric acid, hydrochloric acid, nitric acid, sulfonic acid and methyl sulfonic acid.

Preferred Components: The carbohydrate is chosen from sucrose, xylose and glucose. The non-carbohydrate precursor of polymer is chosen from group of furfuryl alcohol, aniline, acetylene and propylene.

FILE SEGMENT:

MANUAL CODE:

CPI; EPI

CPI: E11-S; E31-A02; E31-N03; J01-D01; J01-E02B; J01-E03C; J04-C04; J06-B06; L03-E04; L03-J  
EPI: X16-B01A3; X16-C; X16-E01

L33 ANSWER 17 OF 18

ACCESSION NUMBER:

DOC. NO. CPI:

DOC. NO. NON-CPI:

TITLE:

WPIX COPYRIGHT 2010 THOMSON REUTERS on STN

2003-527628 [200350] WPIX

C2003-142539 [200350]

N2003-418805 [200350]

Manufacture of carbon molecule corpuscle for sensor, involves decomposing material formed by polymerizing carbohydrate precursor, acid or carbon polymer in air hole of meso porous aluminum-silicate molecular corpuscle  
A35; E36; J04; L03; Q68; X16

DERWENT CLASS:

September 20, 2010

10/593,918

64

INVENTOR: CHOI S J; JOO S H; JU S H; RYOO R; YOO R  
 PATENT ASSIGNEE: (KOAD-C) KOREA ADV INST SCI & TECHNOLOGY  
 COUNTRY COUNT: 2

## PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
JP 2003034516	A	20030207	(200350)*	JA	7[6]	
<--						
KR 2002084372	A	20021107	(200350)	KO		
<--						
KR 420787	B	20040302	(200443)	KO		
<--						

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
JP 2003034516 A		JP 2001-312079	
20011010			
KR 2002084372 A		KR 2001-23541	20010430
KR 420787 B		KR 2001-23541	20010430

## FILING DETAILS:

PATENT NO	KIND	PATENT NO
KR 420787 B	Previous Publ	KR 2002084372 A

PRIORITY APPLN. INFO: KR 2001-23541 20010430

## INT. PATENT CLASSIF.:

MAIN: C01B0031-02  
 IPC RECLASSIF.: B01J0020-20 [I,A]; B01J0020-20 [I,C]; B82B0003-00 [I,A]; B82B0003-00 [I,C]; C01B0003-00 [I,A]; C01B0003-00 [I,C]; C01B0031-00 [I,C]; C01B0031-02 [I,A]; H01M0004-96 [I,A]; H01M0004-96 [I,C]  
 ECLA: B01J0020-20; C01B0003-00D2C; C01B0031-02  
 ICO: Y01N0006:00

## JAP. PATENT CLASSIF.:

MAIN/SEC.: B01J0020-20 A; B82B0003-00; C01B0003-00 B; C01B0031-02 101 F; C01B0031-02 101 Z; H01M0004-96 B 3C052; 3C081; 3C082; 4G040; 4G046; 4G066; 4G140; 4G146; 5H018; 4G066/AA04.B; 5H018/AA06; 4G146/AA11; 4G066/AA20; 4G066/AA22.D; 4G066/AA32.D; 4G066/AA34.D; 4G040/AA36; 4G040/AA42; 4G066/AA47.D; 4G066/AA53.D; 4G066/AB01.A; 4G066/AB06.A; 4G146/AB06; 4G146/AB08; 4G066/AB13.A; 4G066/AC02.A; 4G146/AC04.A; 4G146/AC04.B; 4G146/AC08.A; 4G146/AC08.B; 4G146/AC09.A; 4G146/AC09.B; 4G146/AC10.A; 4G146/AC10.B; 4G146/AC17.B; 4G146/AC28.B; 4G146/AC30.B; 4G146/AD01; 4G146/AD11; 4G146/AD17; 4G146/AD23; 4G146/AD24; 4G146/AD32; 4G146/AD35; 4G146/AD40; 5H018/AS03; 4G146/BA11; 4G146/BA12; 4G146/BA13; 4G146/BA15; 4G146/BA18; 4G066/BA25; 4G066/BA26; 4G146/BA32; 5H018/BB01; 4G146/BB04; 4G146/BB05; 5H018/BB05; 4G146/BB06; 4G146/BB10; 4G146/BB11; 5H018/BB16; 4G146/BB23; 4G146/BC01; 4G146/BC03; 4G146/BC23; 4G146/BC27;



4G146/BC32.A; 4G146/BC33.A; 4G146/BC33.B;  
4G146/BC34.A; 4G146/BC41; 4G146/BC42; 4G146/BC47;  
4G146/BC48; 4G046/CA00; 4G046/CA04; 4G066/CA38;  
4G066/CA56; 4G046/CB01; 4G146/CB29; 4G046/CC02;  
4G046/CC09; 5H018/DD01; 5H018/EE05; 4G066/FA07;  
4G066/FA34; 5H018/HH02; 5H018/HH04

## BASIC ABSTRACT:

JP 2003034516 A UPAB: 20050531

NOVELTY - A precursor of carbohydrate aqueous solution, acid mixture or carbon polymer is polymerized in air hole of meso porous aluminum-silicate molecular-corpuse (MCM) used as mold. MCM is heated at 400-1400degreesC under vacuum or anoxia and polymerized material is thermally decomposed. MCM is reacted with hydrofluoric acid/sodium hydroxide aqueous solution. The mold is removed and carbon molecule corpuse is formed.

DETAILED DESCRIPTION - A precursor of carbohydrate aqueous solution, mixture of acid or carbon polymer is polymerized in an air hole of meso porous aluminum-silicate molecular-corpuse (MCM) used as a casting mold. MCM is heated at 400-1400degreesC under vacuum or anoxia and the polymerized material in the air hole is thermally decomposed. The heated MCM is reacted with hydrofluoric acid or sodium hydroxide aqueous solution. The casting mold portion is removed and carbon molecule corpuse is produced.

An INDEPENDENT CLAIM is included for carbon molecular corpuse.

USE - For producing carbon molecular corpuse used for absorbent of organic substances, fuel cells, electrode materials and hydrogen reserve substances.

ADVANTAGE - The carbon molecular corpuse obtained has excellent reactivity with respect to hydrogen adsorption. The carbon nanotube formed in the air hole of the MCM has uniform diameter.

DESCRIPTION OF DRAWINGS - The figure shows the nitrogen adsorption isotherm of CMK-5 carbon molecular corpuse and air-hole size distribution of the carbon molecular corpuse. (Drawing includes non-English language text).

## TECHNOLOGY FOCUS:

ORGANIC CHEMISTRY - Preferred Compounds: The mesoporous aluminum-silicate molecular-corpuse material is SBA-15 or SBA-3. The carbohydrate is sucrose, xylose or glucose. The acid is sulfuric acid, hydrochloric acid, nitric acid, sulfonic acid or methyl sulfonic acid. The precursor of carbon polymer is furfuryl alcohol, aniline, acetylene or propylene.

## FILE SEGMENT:

CPI; GMP; EPI

## MANUAL CODE:

CPI: A10-E05B; A12-W12G; E10-A09B5; E31-B; E31-F04;  
E31-H05; E33-A03; J04-C04; L03-E04B  
EPI: X16-E06A

L33 ANSWER 18 OF 18

## ACCESSION NUMBER:

WPIX COPYRIGHT 2010 THOMSON REUTERS on STN  
2001-425043 [200145] WPIX

## DOC. NO. CPI:

C2001-128534 [200145]

## DOC. NO. NON-CPI:

N2001-315356 [200145]

## TITLE:

Preparing patterned layer of aligned carbon nanotubes on substrate for semiconductors, includes applying polymeric material pattern on substrate using soft lithographic technique, carbonizing or synthesizing aligned carbon nanotubes layer

## DERWENT CLASS:

A35; A89; E12; E36; L03; Q68; U11; U12

## INVENTOR:

DAI L; DAI L M; HUANG S; MAU A

## PATENT ASSIGNEE:

(CSIR-C) COMMONWEALTH SCI & IND RES ORG; (UYDA-N)  
UNIV DAYTON

## COUNTRY COUNT:

93

## PATENT INFORMATION:

PATENT NO	KIND	DATE	WEEK	LA	PG	MAIN IPC
WO 2001021863	A1	20010329	(200145)*	EN	26{6}	
<---						
AU 2000076340	A	20010424	(200145)	EN		
<---						
EP 1230448	A1	20020814	(200261)	EN		
<---						
JP 2003510236	T	20030318	(200321)	JA	29	
<---						
AU 776402	B2	20040909	(200479)	EN		
<---						
US 6866801	B1	20050315	(200520)	EN		
<---						
EP 1230448	B1	20060802	(200651)	EN		
DE 60029816	E	20060914	(200661)	DE		
DE 60029816	T2	20070802	(200753)	DE		

## APPLICATION DETAILS:

PATENT NO	KIND	APPLICATION	DATE
WO 2001021863 A1		WO 2000-AU1180	
20000922			
AU 2000076340 A		AU 2000-76340	20000922
AU 776402 B2		AU 2000-76340	20000922
DE 60029816 E		DE 2000-60029816	
20000922			
EP 1230448 A1		EP 2000-965658	
20000922			
EP 1230448 B1		EP 2000-965658	
20000922			
DE 60029816 E		EP 2000-965658	
20000922			
EP 1230448 A1		WO 2000-AU1180	
20000922			
JP 2003510236 T		WO 2000-AU1180	
20000922			
US 6866801 B1		WO 2000-AU1180	
20000922			
EP 1230448 B1		WO 2000-AU1180	
20000922			
DE 60029816 E		WO 2000-AU1180	
20000922			
JP 2003510236 T		JP 2001-525017	
20000922			
US 6866801 B1		US 2002-88737	20020619
DE 60029816 T2		DE 2000-60029816	
20000922			
DE 60029816 T2		EP 2000-965658	
20000922			
DE 60029816 T2		WO 2000-AU1180	
20000922			

## FILING DETAILS:

PATENT NO	KIND	PATENT NO
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AU 776402 B2	Previous Publ	AU 2000076340 A
DE 60029816 E	Based on	EP 1230448 A
AU 2000076340 A	Based on	WO 2001021863 A
EP 1230448 A1	Based on	WO 2001021863 A
JP 2003510236 T	Based on	WO 2001021863 A
AU 776402 B2	Based on	WO 2001021863 A
US 6866801 B1	Based on	WO 2001021863 A
EP 1230448 B1	Based on	WO 2001021863 A
DE 60029816 E	Based on	WO 2001021863 A
DE 60029816 T2	Based on	EP 1230448 A
DE 60029816 T2	Based on	WO 2001021863 A

PRIORITY APPLN. INFO: AU 1999-3041

19990923

INT. PATENT CLASSIF.:

MAIN: C01B0031-02  
 IPC ORIGINAL: C01B0031-00 [I,C]; C01B0031-00 [I,C];  
 C01B0031-02 [I,A]; C01B0031-02  
 [I,A]; C30B0023-02 [I,C]; C30B0023-02 [I,C];  
 C30B0023-04 [I,A]; C30B0023-04 [I,A]; C30B0029-00  
 [I,C]; C30B0029-00 [I,C]; C30B0029-02 [I,A];  
 C30B0029-02 [I,A]; C30B0029-02 [I,C]; C30B0029-66  
 [I,A]; C30B0029-66 [I,A]; C01B0031-00 [I,C];  
 C30B0023-02 [I,C]; C30B0029-00 [I,C]; C30B0029-02  
 [I,C]

IPC RECLASSIF.: C01B0031-00 [I,C]; C01B0031-02 [I,A];  
 C30B0023-02 [I,C]; C30B0023-04 [I,A]; C30B0025-00  
 [I,A]; C30B0025-00 [I,C]; C30B0029-00 [I,C];  
 C30B0029-02 [I,A]; C30B0029-02 [I,C]; C30B0029-66  
 [I,A]

ECLA: C01B0031-02B; C30B0025-00+029/60D

ICO: Y01N0006:00; Y01N0008:00

USCLASS NCLM: 264/029.100

NCLS: 264/081.000; 264/319.000; 423/445.00B; 977/843.000;  
 977/887.000

JAP. PATENT CLASSIF.:

MAIN/SEC.: C01B0031-02 101 F

FTERM CLASSIF.: 4G046; 4G046/CA04; 4G046/CB01; 4G046/CB08;  
 4G046/CB09; 4G046/CC03; 4G046/CC05; 4G046/CC08

BASIC ABSTRACT:

WO 2001021863 A1 UPAB: 20050901

NOVELTY - Preparing a patterned layer of aligned carbon nanotubes on a substrates using a soft lithographic technique.

DETAILED DESCRIPTION - Preparing a patterned layer of aligned carbon nanotubes on a substrate including:

(a) applying a pattern of polymeric material on the surface of a substrate capable of supporting nanotube capable of supporting nanotube growth using a soft lithographic technique;

(b) subjecting the polymeric material to carbonization to form a patterned layer of carbonized polymer on the surface of the substrate; or

(c) synthesizing a layer of aligned carbon nanotubes on regions of the substrate to which carbonized polymer is not attached to provide a patterned layer of aligned carbon nanotubes on the substrate.

INDEPENDENT CLAIMS are also included for:

(1) a patterned carbon nanotube film prepared using the claimed method;

(2) a device comprising a patterned carbon nanotube film prepared by the claimed method; and

(3) a photovoltaic cell comprising a patterned carbon nanotube film prepared by the claimed method.

USE - Used for photonic and electronic devices for use as electron field emitters in panel displays, single molecular transistors, scanning probe

microscope tips, gas electrochemical energy storages, catalyst and proteins/DNA supports, artificial actuators, chemical sensors, molecular filtration membranes, energy absorbing materials, semiconductors, molecular transistors and other opto-electronic devices.

ADVANTAGE - Allows resolutions up to a sub-micrometer scale.

DESCRIPTION OF DRAWINGS - Figure 2 is a schematic showing the stages involved in the preparation of a pattern layer of aligned carbon nanotubes.

TECHNOLOGY FOCUS:

CERAMICS AND GLASS - Preferred Substrate: The substrate is a glass selected from quartz glass, graphite, mica, mesoporous silica, silicon wafer, nanoporous alumina and ceramic plates, preferably quartz glass or silicon wafer.

The substrate comprises a coating of a material which is capable of supporting carbon nanotube growth under the conditions employed.

Preferred Coating: The coating is selected from metal, metal alloy or compound having conducting or semiconductor properties, preferably selected from Au, Pt, Cu, Fe, Co and Pd.

The coating is a metal compound or metal alloy selected from an oxide, carbide, nitride, sulfide or boride, preferably selected from indium tin oxide (ITO), Al<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub>, and MgO.

The coating is a semiconducting material selected from gallium arsenide, aluminum arsenide, aluminum sulfide and gallium sulfide.

Preferred Process: The soft lithographic technique is preferably a microcontact printing technique, micromolding technique.

Self-assembling monolayers (SAMs) or a molecular ink is applied to the surface of the substrate in a region specific manner, followed by adsorption of the polymeric material is the SAM-free regions.

The hydrophobicity and hydrophilicity of the surface of the substrate is altered by the region specific transfer of the substrate of a material which alters the hydrophobicity or hydrophilicity of the surface, followed the adsorption of the polymer in the more hydrophobic regions of the substrate surface.

The micromolding technique comprises applying a thin layer of a solution of the polymeric material in a solvent to the substrate surface, sandwiching the solution between the substrate surface and a mold surface, the mold having incised areas corresponding to the pattern to be formed on the substrate surface, allowing the solvent to evaporate and removing the mold to provide a pattern of polymeric material on the substrate.

Preferred Molecular Ink: The molecular ink is an alkylsiloxane which is applied using a stamp.

POLYMERS - Preferred Polymer: The polymer is a photoresist or photoresponsive material.

The polymeric material is (DNQ)-modified cresol novolac resin or Ozatek PL 14(TM) (Hoescht) selected from epoxy resins, PEO, polyanilines, polymethyl methacrylates, polystyrenes, polydienes, and plasma polymers derived from (un)saturated alcohols, ketones, aldehydes, amines or amides.

Preferred Mold: The mold is composed of PDMS, fluorocarbon or other solvent resistant elastomers.

Preferred Process: The polymeric material is carbonized by heating to a temperature at or above a temperature at which the polymeric material decomposes.

The aligned carbon nanotubes are synthesized by pyrolysis of a carbon-containing material in the presence of a suitable catalyst for nanotube formation.

The pyrolysis is carried out at 500 - 1100 degreesC.

The process further comprises dissociating the aligned carbon nanotubes from the substrates by immersing the sample in an aqueous hydrofluoric acid solution (10-40 %w/w).

The dissociation comprises transferring the patterned carbon nanotube layer to another substrate selected from another substrate capable of supporting carbon nanotube growth, a metal, metal oxide, semiconductor or a polymer selected from adhesive coated polymers preferably cellulose, conjugated (conducting) polymers, temperature/pressure responsive polymers, bioactive polymers and engineering resins.

Preferred Catalyst: The carbon-containing material is selected from alkanes, alkenes, alkynes or aromatic hydrocarbons and their derivatives, preferably from methane, acetylene and benzene, organometallic compounds of transition metals selected from metallocenes and other suitable evaporable metal complexes.

The catalyst is a transition metal selected from Fe, Co, Al, Ni, Mn, Pd, Cr or alloys in any suitable oxidation state.

The catalyst is incorporated in the carbon-containing material.

The catalyst is selected from Fe(II)phthalocyanine, Ni(II)phthalocyanine and ferrocene.

Preferred Catalyst Preparation: The catalyst preparation further comprises an additional source of catalyst, carbon-containing material.

#### EXTENSION ABSTRACT:

EXAMPLE - Quartz glass plates were cleaned by heating in a Piranha solution (a mixture of 98% H<sub>2</sub>SO<sub>4</sub> and 30% H<sub>2</sub>O<sub>2</sub> at 7:3 v/v) at 70 degreesC for about 30 minutes, followed by thoroughly rinsing with deionized water. PDMS stamp was used for patterning an octadecyltrichlorosiloxane (OST) SAM layer on the cleaned quartz surface. After the contact transfer of the ink (i.e. 0.2% w/w of OST in hexane), the PDMS stamp was left in contact with the substrate for 15-30 seconds, and the patterned substrate was then immersed into a diazonaphthoquinone (DNQ) modified cresol novolak photoresist solution (0.5 -1.0 mg/ml) in ethoxyethyl acetate/acetone (1/10-1/5 v/v) for about 1 second for selective absorption of the polymer into the OST-free region. The polymer pre-patterned quartz plate was heated at high temperature under Ar atmosphere to carbonize the photoresist polymer into a carbon layer. The carbonization was carried out to heat the patterned DNQ-novolac photoresist coating at 150 degreesC, 300, 500, 700 and 900 degreesC for 30 minutes at each temperature. The carbon nanotube patterns were then prepared by selectively growing aligned nanotubes in the photoresist-free regions by pyrolysis of FePc under Ar at 800-1000 degreesC.

FILE SEGMENT:

MANUAL CODE:

CPI; GMPI; EPI

CPI: A10-E05B; A11-B05; A12-E07C; A12-L02B2;

E05-U; E05-U02; L04-C06; N02-A; N02-C01;

N04-A; N05-B; N05-C

EPI: U11-C04A7; U12-B03X

=> FIL HCAP CEABA-VIB

FILE 'HCAPLUS' ENTERED AT 12:36:35 ON 20 SEP 2010

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PLEASE SEE "HELP USAGETERMS" FOR DETAILS.

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FILE 'CEABA-VTB' ENTERED AT 12:36:35 ON 20 SEP 2010  
 COPYRIGHT (c) 2010 DECHEMA eV

=> D L161 1-10 ALL

L161 ANSWER 1 OF 10 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2010:930879 HCAPLUS Full-text

DN 153:248035

ED Entered STN: 28 Jul 2010

TI Organic thin film transistor having surface-modified carbon nanotubes

IN Han, Kook Min; In, Kyu Yeol; Park, Jong Jin; Moon, Hyun Sik; Lee, Sang Yoon

PA Samsung Electronics Co., Ltd., S. Korea

SO U.S., 10pp., Cont.-in-part of U.S. Ser. No. 798023

CODEN: USXXAM

DT Patent

LA English

CC 76-3 (Electric Phenomena)

Section cross-reference(s): 38, 48, 73, 74

FAN.CNT 3

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	US 7763885	B2	20100727	US 2007-898977	20070918
				<--	
	US 20080191198	A1	20080814		
	US 20090121216	A9	20090514		
	KR 2004076512	A	20040901	KR 2003-11898	20030226
				<--	
	KR 947702	B1	20100316		
	US 20040265755	A1	20041230	US 2004-786592	20040226
				<--	
	US 7229747	B2	20070612		
	KR 2008049343	A	20080604	KR 2006-119799	20061130
	US 20080153991	A1	20080626	US 2007-798023	20070509
				<--	
	JP 2009093186	A	20090430	JP 2008-271282	20081021
				<--	
	US 20100159219	A1	20100624	US 2009-588287	20091009
				<--	
PRAI	KR 2003-11898	A	20030226	<--	
	US 2004-786592	A3	20040226	<--	
	KR 2006-119799	A	20061130		
	US 2007-798023	A2	20070509		

JP 2004-50632	A3	20040226	<--
CLASS			
PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES	
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US 7763885	INCL	257040000; 257-E51.008; 257-E51.027; 438099000; 977745000	
	IPCI	H01L0051-10 [I,A]; H01L0051-10 [I,A]; H01L0051-10 [I,A]; H01L0051-05 [I,C*]	
	IPCR	H01L0051-05 [I,C]; H01L0051-10 [I,A]	
	NCL	257/040.000; 257/E51.008; 257/E51.027; 438/099.000; 977/745.000	
	ECLA	H01L051/00M4D2; H01L051/00M2B2; T01L051:00M2F; T01L051:05B2B4; T01L051:05B2B6; Y01N004:00	
KR 2004076512	IPCI	G03F0007-11 [I,A]	
	ECLA	C09D007/12S; C01B031/02B; G03F007/038C; Y01N006:00	
US 20040265755	IPCI	G03C0005-00 [I,A]	
	IPCR	B82B0001-00 [I,C*]; B82B0001-00 [I,A]; B05D0001-32 [I,C*]; B05D0001-32 [I,A]; B05D0003-06 [I,C*]; B05D0003-06 [I,A]; B32B0009-00 [I,C*]; B32B0009-00 [I,A]; B82B0003-00 [I,C*]; B82B0003-00 [I,A]; C01B0031-00 [I,C*]; C01B0031-02 [I,A]; G03F0007-038 [I,C*]; G03F0007-038 [I,A]; G03C0005-00 [I,C]; G03C0005-00 [I,A]; G03F0007-11 [I,C*]; G03F0007-11 [I,A]	
	NCL	430/322.000; 430/270.100; 430/325.000; 427/385.500; 430/311.000; 977/842.000	
	ECLA	C09D007/12S; C01B031/02B; G03F007/038C; Y01N006:00	
KR 2008049343	IPCI	H01L0029-786 [I,A]; H01L0029-66 [I,C*]	
	IPCR	H01L0029-66 [I,C]; H01L0029-786 [I,A]	
	ECLA	H01L051/00M4D2; H01L051/00M2B2; T01L051:00M2F; T01L051:05B2B4; T01L051:05B2B6; Y01N004:00	
US 20080153991	IPCI	C08G0065-00 [I,A]; C07D0303-12 [I,A]; C07D0303-00 [I,C*]; C07D0307-06 [I,A]; C07D0307-77 [I,A]; C07D0307-00 [I,C*]	
	NCL	525/409.000; 549/465.000; 549/477.000; 549/555.000	
	ECLA	C09D007/12S; C01B031/02B; G03F007/038C; Y01N006:00	
JP 2009093186	IPCI	G03F0007-038 [I,A]; B82B0001-00 [I,A]; B82B0003-00 [I,A]; C01B0031-02 [I,A]; C01B0031-00 [I,C*]; C08L0101-00 [I,A]; C08K0009-04 [I,A]; C08K0009-00 [I,C*]; G03F0007-004 [I,A]; G03F0007-075 [I,A]; G03F0007-032 [I,A]; G03F0007-38 [I,A]; H01L0021-027 [I,A]; H01L0021-02 [I,C*]; B05D0007-24 [I,A]; B82B0001-00 [I,C*]; B82B0001-00 [I,A]; G03F0007-038 [I,C]; G03F0007-038 [I,A]; B05D0001-32 [I,C*]; B05D0001-32 [I,A]; B05D0003-06 [I,C*]; B05D0003-06 [I,A]; B05D0007-24 [I,C]; B05D0007-24 [I,A]; B32B0009-00 [I,C*]; B32B0009-00 [I,A]; B82B0003-00 [I,C]; B82B0003-00 [I,A]; C01B0031-00 [I,C]; C01B0031-02 [I,A]; C08K0009-00 [I,C]; C08K0009-04 [I,A]; C08L0101-00 [I,C]; C08L0101-00 [I,A]; G03F0007-004 [I,C]; G03F0007-004 [I,A]; G03F0007-032 [I,C]; G03F0007-032 [I,A]; G03F0007-075 [I,C]; G03F0007-075 [I,A];	
	IPCR		

G03F0007-11 [I,C\*]; G03F0007-11 [I,A];  
G03F0007-38 [I,C]; G03F0007-38 [I,A]; H01L0021-02  
[I,C]; H01L0021-027 [I,A]

ECLA C09D007/12S; C01B031/02B; G03F007/038C;  
Y01N006:00

FTERM 2H025/AA14; 2H025/AB14; 2H025/AB16; 2H025/AB17;  
2H025/AB20; 2H025/AC01; 2H025/AD01; 2H025/BD23;  
2H025/BD24; 2H025/BD25; 2H025/BE00; 2H025/BE07;  
2H025/CA09; 2H025/CA41; 2H025/CB07; 2H025/CB16;  
2H025/CC03; 2H025/CC06; 2H025/FA12; 2H025/FA15;  
2H096/AA25; 2H096/AA27; 2H096/AA28; 2H096/AA30;  
2H096/BA06; 2H096/EA02; 2H096/FA01; 2H096/GA03;  
4D075/BB26Z; 4D075/BB46Z; 4D075/EC01; 4D075/EC24;  
4D075/EC37; 4D075/EC45; 4D075/EC53; 4D075/EC54;  
4G146/AA11; 4G146/AA29; 4G146/BA04; 4G146/CA11;  
4G146/CB14; 4G146/CB22; 4G146/CB35; 4J002/AC031;  
4J002/AC061; 4J002/AC071; 4J002/AC081;  
4J002/AC111; 4J002/BB151; 4J002/BB171;  
4J002/BB181; 4J002/BC021; 4J002/BD151;  
4J002/BE021; 4J002/BE061; 4J002/BG041;  
4J002/BG061; 4J002/BG131; 4J002/CB001;  
4J002/CC031; 4J002/CC161; 4J002/CC181;  
4J002/CD001; 4J002/CF001; 4J002/CF161;  
4J002/CG001; 4J002/CH071; 4J002/CH091;  
4J002/CL001; 4J002/CM021; 4J002/CM041;  
4J002/CN011; 4J002/CN031; 4J002/CP031;  
4J002/DA016; 4J002/FB086; 4J002/FB236;  
4J002/FD016; 4J002/FD116; 4J002/FD140;  
4J002/FD150; 4J002/GQ00; 4J002/HA08; 5F046/JA09;  
5F046/JA27

US 20100159219 IPCI B32B0003-10 [I,A]; C08K0005-1515 [I,A];  
C08K0005-1539 [I,A]; C08K0005-07 [I,A];  
C08K0005-151 [I,A]; C08K0005-00 [I,C\*];  
C07D0307-83 [I,A]; C07D0307-60 [I,A]; C07D0307-00  
[I,C\*]; C07D0493-00 [I,A]; C07D0303-12 [I,A];  
C07D0303-00 [I,C\*]; C07C0049-303 [I,A];  
C07C0049-00 [I,C\*]

IPCR B32B0003-10 [I,C]; B32B0003-10 [I,A]; B82B0001-00  
[I,C\*]; B82B0001-00 [I,A]; B05D0001-32 [I,C\*];  
B05D0001-32 [I,A]; B05D0003-06 [I,C\*];  
B05D0003-06 [I,A]; B32B0009-00 [I,C\*];  
B32B0009-00 [I,A]; B82B0003-00 [I,C\*];  
B82B0003-00 [I,A]; C01B0031-00 [I,C\*];  
C01B0031-02 [I,A]; C07C0049-00 [I,C];  
C07C0049-303 [I,A]; C07D0303-00 [I,C];  
C07D0303-12 [I,A]; C07D0307-00 [I,C]; C07D0307-60  
[I,A]; C07D0307-83 [I,A]; C07D0493-00 [I,C];  
C07D0493-00 [I,A]; C08K0005-00 [I,C]; C08K0005-07  
[I,A]; C08K0005-151 [I,A]; C08K0005-1515 [I,A];  
C08K0005-1539 [I,A]; G03F0007-038 [I,C\*];  
G03F0007-038 [I,A]; G03F0007-11 [I,C\*];  
G03F0007-11 [I,A]

NCL 428/206.000; 524/107.000; 524/112.000;  
524/114.000; 524/358.000; 549/232.000;  
549/243.000; 549/253.000; 549/554.000;  
568/326.000; 977/746.000

ECLA C09D007/12S; C01B031/02B; G03F007/038C;  
Y01N006:00



- AB An organic thin film transistor may comprise an organic semiconductor layer having surface-modified C nanotubes and an elec.-conductive polymer. The surfaces of the C nanotubes may be modified with curable functional groups, comprising oxirane groups and anhydride groups. A room-temperature solution process may be used to provide a relatively uniform and relatively highly-adhesive organic semiconductor layer in a simple and economical manner. Addnl., the organic thin film transistor having the organic semiconductor layer may have relatively high charge carrier mobility and relatively low threshold voltage.
- ST org TFT surface modified carbon nanotube fabrication
- IT Functional groups  
(anhydride group; organic TFT having surface-modified carbon nanotubes and its fabrication)
- IT Nanotubes  
(carbon; organic TFT having surface-modified carbon nanotubes and its fabrication)
- IT Electroluminescent devices  
(displays; organic TFT having surface-modified carbon nanotubes and its fabrication)
- IT Luminescent screens  
(electroluminescent; organic TFT having surface-modified carbon nanotubes and its fabrication)
- IT Functional groups  
(glycidyl ether; organic TFT having surface-modified carbon nanotubes and its fabrication)
- IT Adhesive films  
Carboxyl group  
Coating process  
Conducting polymers  
Electroluminescent devices  
Epoxy group  
Field emission displays  
Liquid crystal displays  
Plasma display panels  
Semiconductor films  
Thin film transistors  
(organic TFT having surface-modified carbon nanotubes and its fabrication)
- IT Poly(arylenealkenylenes)  
Polyacetylenes  
Polyanilines  
Polyoxyphenylenes  
Polypyrroles  
Polythiazoles  
Polythiophenes  
(organic TFT having surface-modified carbon nanotubes and its fabrication)
- IT Functional groups  
(surface; organic TFT having surface-modified carbon nanotubes and its fabrication)
- IT 7440-44-0P, Carbon, processes  
(nanotubes; organic TFT having surface-modified carbon nanotubes and its fabrication)
- IT 67-56-1, Methanol, processes 67-64-1, Acetone, processes 67-66-3, Chloroform, processes 68-12-2, Dimethylformamide, processes 109-99-9, Tetrahydrofuran, processes 110-86-1, Pyridine, processes 141-78-6, Ethyl acetate, processes  
(organic TFT having surface-modified carbon nanotubes and its fabrication)

IT 64-19-7, Acetic acid, processes 108-24-7, Acetic anhydride 556-52-5, Glycidol 7719-09-7, Thionyl chloride 22479-95-4, Dimethyl 4-hydroxyphthalate (organic TFT having surface-modified carbon nanotubes and its fabrication)

IT 7664-93-9, Sulfuric acid, processes 7697-37-2, Nitric acid, processes (organic TFT having surface-modified carbon nanotubes and its fabrication)

IT 91-20-3D, Naphthalene, cyano derivs, polymers 9033-83-4, Poly(phenylene) 25067-58-7, Polyacetylene 25190-62-9, Poly(1,4-phenylene) 25190-62-9D, Poly(1,4-phenylene), derivs. 25233-30-1, Polyaniline 25233-34-5, Polythiophene 25233-34-5D, Polythiophene, alkyl derivs. 30604-81-0, Polypyrrole 42441-75-8D, Heptadiene, polymer derivs. 95270-88-5, Polyfluorene 95270-88-5D, Polyfluorene, derivs. 96638-49-2, Polyphenylenevinylene 96638-49-2D, Polyphenylenevinylene, dialkoxo derivs. 126213-51-2, Polyethylenedioxythiophene 126213-51-2D, Polyethylenedioxythiophene, derivs. 204197-86-4 204197-86-4D, derivs. (organic TFT having surface-modified carbon nanotubes and its fabrication)

IT 75-36-5DP, Acetyl chloride, carbon nanotube surface group (organic TFT having surface-modified carbon nanotubes and its fabrication)

IT 108-88-3, Toluene, processes 7647-01-0, Hydrogen chloride, processes (purification agent; organic TFT having surface-modified carbon nanotubes and its fabrication)

OSC.G 3 THERE ARE 3 CAPLUS RECORDS THAT CITE THIS RECORD (3 CITINGS)

UPOS.G Date last citing reference entered STN: 30 Jul 2010

OS.G CAPLUS 2008:308762; 2007:609283; 2006:170664

L161 ANSWER 2 OF 10 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2006:800497 HCAPLUS Full-text

DN 145:218816

ED Entered STN: 14 Aug 2006

TI Method for preparing single-walled carbon nanotube tip by wet chemical assembly

IN Peng, Hailin; Chen, Zhuo; Tong, Lianming; Ran, Chunbo; Liu, Zhongfan

PA Peking University, Peop. Rep. China

SO Faming Zhuanli Shenqing Gongkai Shuomingshu, 12pp.

CODEN: CNXXEV

DT Patent

LA Chinese

CC 66-6 (Surface Chemistry and Colloids)

Section cross-reference(s): 57

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
	-----	----	-----	-----	-----
PI	CN 1815181	A	20060809	CN 2005-10004833	20050202

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PRAI CN 2005-10004833

20050202 <--

CLASS

PATENT NO. CLASS PATENT FAMILY CLASSIFICATION CODES

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CN 1815181	IPCI	G01N0013-12 [I,A]; G01N0013-10 [I,C*]; G12B0021-04 [I,A]; G12B0021-00 [I,C*]; B82B0001-00 [I,A]
	IPCR	G01N0013-10 [I,C]; G01N0013-12 [I,A]; B82B0001-00 [I,C]; B82B0001-00 [I,A]; G12B0021-00 [I,C]; G12B0021-04 [I,A]

AB The title nanotube tip includes a scanning tunneling microscope (STM) tip and multiple single-walled carbon nanotubes, wherein the carbon nanotubes and the STM tip are joined through amido bonds. The title method includes soaking gold tip or gold-coated tip in alc. solution of amino-thiol to obtain tip modified by amino-thiol film, and immersing the modified tip into the organic solution of short single-walled carbon nanotubes with carboxyl groups to obtain the final nanotube tip, wherein the organic solution is added with dehydrating agent. The method has the advantages of simple operation, good reproducibility, and high product yield (more than 40%). The nanotube tip can be used in STM, and preparation for high resolution imaging or ultra high information d. memory medium.

ST single walled carbon nanotube tip gold amino thiol

IT Nanotubes  
(carbon; method for preparing single-walled carbon nanotube tip by wet chemical assembly)

IT 60-23-1 40451-21-6, Mercapto aniline 155638-19-0  
714974-72-8  
(method for preparing single-walled carbon nanotube tip by wet chemical assembly)

IT 538-75-0, Dicyclohexylcarbodiimide 7664-93-9, Sulfuric acid, uses 7722-84-1, Hydrogen peroxide, uses  
(method for preparing single-walled carbon nanotube tip by wet chemical assembly)

IT 7440-57-5, Gold, uses  
(method for preparing single-walled carbon nanotube tip by wet chemical assembly)

IT 7440-44-0F, Carbon, properties  
(nanotubes; method for preparing single-walled carbon nanotube tip by wet chemical assembly)

L161 ANSWER 3 OF 10 HCAPLUS COPYRIGHT 2010 ACS on STN  
AN 2005:202097 HCAPLUS [Full-text](#)  
DN 142:432434  
ED Entered STN: 08 Mar 2005  
TI Microwave-induced rapid chemical functionalization of single-walled carbon nanotubes  
AU Wang, Yubing; Iqbal, Zafar; Mitra, Somenath  
CS Department of Chemistry and Environmental Science, New Jersey  
Institute of Technology, Newark, NJ, 07102, USA  
SO Carbon (2005), 43(5), 1015-1020  
CODEN: CRBNAH; ISSN: 0008-6223  
PB Elsevier Ltd.  
DT Journal  
LA English  
CC 49-10 (Industrial Inorganic Chemicals)  
AB The microwave-induced chemical functionalization of single-walled carbon nanotubes (SWNTs) is reported. The major advantage of this high-energy procedure is that it reduced the reaction time to the order of minutes and the number of steps in the reaction procedure compared to that of conventional functionalization processes. Two successful model reactions, namely amidation and 1,3-dipolar cycloaddn. of SWNTs were carried out. The amidation was completed in two steps as compared to three in the conventional approach. The

step involving acid chloride formation was eliminated here, and the yield remained the same. The 1,3-dipolar cycloaddn. of SWNTs was carried out in 15 min under microwave conditions, and the results were similar to what was achieved in 5 days using conventional methods. This finding opens the door to fast and inexpensive processing to produce functional SWNTs, which is extremely important for their use in real-world applications.

- ST microwave functionalization single walled carbon nanotube
- IT Cycloaddition reaction  
(1,3-dipolar; microwave induced rapid functionalization of single-walled carbon nanotubes)
- IT Nanotubes  
(carbon, single-walled, functionalized; microwave induced rapid functionalization of single-walled carbon nanotubes)
- IT Amidation  
Carboxylation  
Functional groups  
Microwave  
(microwave induced rapid functionalization of single-walled carbon nanotubes)
- IT Aldehydes, processes  
Amino acids, processes  
(microwave induced rapid functionalization of single-walled carbon nanotubes)
- IT 63-68-3, L-Methionine, processes 68-12-2, DMF, processes 90-02-8, processes 606-22-4, 2,6-Dinitroaniline 7697-37-2, Nitric acid, processes  
(microwave induced rapid functionalization of single-walled carbon nanotubes)
- IT 7440-44-0DDP, Carbon, functionalized derivs.  
(single-walled nanotubes; microwave induced rapid functionalization of single-walled carbon nanotubes)
- OSC.G 58 THERE ARE 58 CAPLUS RECORDS THAT CITE THIS RECORD (58 CITINGS)
- UPOS.G Date last citing reference entered STN: 03 Sep 2010
- OS.G CAPLUS 2010:1072822; 2010:1005165; 2010:693188; 2010:623626; 2010:288737; 2010:166130; 2010:328137; 2010:128221; 2010:138836; 2009:1554978; 2009:1447638; 2009:1567146; 2009:1463419; 2009:1031519; 2009:741969; 2009:1005119; 2009:822824; 2009:908213; 2009:643140; 2009:240247; 2009:382078; 2009:377548; 2009:138257; 2009:43084; 2009:55258; 2009:120375; 2008:1492624; 2008:1492623; 2008:1492614; 2008:1482167; 2008:1442092; 2008:1373208; 2008:1329282; 2008:1186388; 2008:936517; 2008:777045; 2008:276800; 2008:143672; 2008:141875; 2008:24202; 2008:8417; 2008:4989; 2007:1417753; 2007:1329495; 2007:1302292; 2007:1224205; 2007:800453; 2007:649663; 2007:388242; 2007:167845
- RE.CNT 35 THERE ARE 35 CITED REFERENCES AVAILABLE FOR THIS RECORD
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L161 ANSWER 4 OF 10 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2004:720536 HCAPLUS Full-text

DN 141:246062

ED Entered STN: 03 Sep 2004

TI Sulfonated conducting polymer-grafted carbon material for fuel cell applications

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PA Columbian Chemicals Company, USA

SO U.S. Pat. Appl. Publ., 30 pp., Cont.-in-part of U.S. Ser. No. 445,074.

CODEN: USXXCO

DT Patent

LA English

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 35

FAN.CNT 2

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 20040169165	A1	20040902	US 2004-786652	20040225
US 7390441	B2	20080624		
US 20040110051	A1	20040610	US 2003-445074	20030523
US 7413683	B2	20080819		
PRAI US 2002-382665P	P	20020523	<--	
US 2003-445074	A2	20030523	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 20040169165	INCL	252511000; X52-321.5
	IPCI	H01B0001-06 [I,A]
	IPCR	C08K0009-00 [I,C*]; C08K0009-00 [I,A]; H01B0001-24 [I,C*]; H01B0001-24 [I,A]; H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0004-88 [I,C*]; H01M0004-88 [I,A]; H01M0004-90 [N,C*]; H01M0004-92 [N,A]; H01M0008-10 [I,C*]; H01M0008-10 [I,A]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]; H01B0001-06 [I,C]; H01B0001-06 [I,A]
	NCL	252/511.000; 523/215.000; 252/500.000; 252/512.000; 252/514.000
	ECLA	H01M004/88; H01M004/86B; H01M008/02C4C; H01M008/10B; T01M004:92; T01M004:92S2; T01M008:10E2; Y02E060:12B; Y02E060:52B2B
US 20040110051	IPCI	H01B0001-00 [I,A]; H01B0001-06 [I,A]; H01B0001-22 [I,A]; H01B0001-02 [I,A]
	IPCR	C08K0009-00 [I,C*]; C08K0009-00 [I,A]; H01B0001-24 [I,C*]; H01B0001-24 [I,A]; H01M0004-86 [I,C*]; H01M0004-86 [I,A]; H01M0004-88 [I,C*]; H01M0004-88 [I,A]; H01M0004-90 [N,C*]; H01M0004-92 [N,A]; H01M0008-10 [I,C*]; H01M0008-10 [I,A]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]; H01B0001-00 [I,C]; H01B0001-00 [I,A]; H01B0001-02 [I,C]; H01B0001-02 [I,A]; H01B0001-06 [I,C]; H01B0001-06 [I,A]; H01B0001-22 [I,C]; H01B0001-22 [I,A]
	NCL	252/500.000; 252/062.200; 252/511.000; 429/314.000; 429/494.000; 429/524.000; 429/532.000; 252/512.000; 252/514.000
	ECLA	H01M004/88; H01M004/86B; H01M008/02C4C; H01M008/10B; T01M004:92; T01M004:92S2; T01M008:10E2; Y02E060:12B; Y02E060:52B2B

## ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

- AB A carbon composition with enhanced electronic and protonic conductivity comprises particulate carbonaceous material and a sulfonated conducting polymer containing hetero atoms. The composition can further comprise a metal. Devices comprising the composition can be constructed including supported electrocatalysts, membrane electrode assemblies, and fuel cells. A method for preparing the composition comprises oxidatively polymerizing with ozone a monomer of a conducting polymer containing hetero atoms in the presence of a carbonaceous material and sulfonating the polymer or the monomer. The method grafts the sulfonated conducting polymer to the carbonaceous material. The method can further comprise metalizing the polymer-grafted carbonaceous material.
- ST sulfonated conducting polymer grafted carbon material fuel cell
- IT Nanotubes  
(carbon, graft copolymers, sulfonated; sulfonated conducting polymer-grafted carbon material for fuel cell applications)
- IT Carbon black, uses  
Carbonaceous materials (technological products)  
Fullerenes  
(graft copolymers, sulfonated; sulfonated conducting polymer-grafted carbon material for fuel cell applications)
- IT Polymerization  
(oxidative; sulfonated conducting polymer-grafted carbon material

prepared by)  
IT Platinum-group metal compounds  
Transition metal halides  
(platinum halides, platinizing agent; metalization of sulfonated  
conducting polymer-grafted carbon material)  
IT Conducting polymers  
Fuel cells  
(sulfonated conducting polymer-grafted carbon material for fuel  
cell applications)  
IT 7440-06-4P, Platinum, uses  
(metalization of sulfonated conducting polymer-grafted carbon  
material)  
IT 592-06-3, Platinum cyanide (Pt(CN)<sub>2</sub>) 7440-06-4D, Platinum, salts  
12627-62-2, Platinum sulfide 16941-12-1, Chloroplatinic  
acid 18496-40-7  
(platinizing agent; metalization of sulfonated conducting  
polymer-grafted carbon material)  
IT 50-00-0, Formaldehyde, reactions 302-01-2, Hydrazine, reactions  
1333-74-0, Hydrogen, reactions 7803-49-8, Hydroxylamine, reactions  
16940-66-2, Sodium borohydride  
(reducing agent used to metalize sulfonated conducting  
polymer-grafted carbon material)  
IT 62-53-3DP, Aniline, polymers with carbon material, graft,  
sulfonated 88-21-1DP, Aniline 2-sulfonic acid,  
polymer with carbon material, graft 108-95-2DP, Phenol, polymers  
with carbon material, graft, sulfonated 108-98-5DP, Benzenethiol,  
polymers with carbon material, graft, sulfonated 109-97-7DP,  
Pyrrole, polymers with carbon material, graft, sulfonated  
110-00-9DP, Furan, polymers with carbon material, graft, sulfonated  
110-02-1DP, Thiophene, polymers with carbon material, graft,  
sulfonated 7440-44-0DP, Carbon, graft copolymers,  
sulfonated 7782-42-5DP, Graphite, graft copolymers, sulfonated  
749255-18-3DP, 1H-Pyrrole-3-sulfonic acid, polymer with  
carbon material, graft  
(sulfonated conducting polymer-grafted carbon material for fuel  
cell applications)  
IT 10028-15-6, Ozone, reactions  
(sulfonated conducting polymer-grafted carbon material prepared by  
oxidatively polymerizing with)  
IT 7790-94-5, Chlorosulfonic acid 117122-16-4,  
Acetylsulfonic acid  
(sulfonating agent; sulfonated conducting polymer-grafted carbon  
material for fuel cell applications)  
OSC.G 7 THERE ARE 7 CAPLUS RECORDS THAT CITE THIS RECORD (10  
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UFOS.G Date last citing reference entered STN: 27 Aug 2010  
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2004:720536; 2004:701677; 2004:609635  
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DN 141:193065

ED Entered STN: 27 Aug 2004

TI Conducting polymer-grafted carbon material for fuel cell applications

IN Srinivas, Bollepalli

PA Columbian Chemicals Company, USA

SO U.S. Pat. Appl. Publ., 25 pp., Cont.-in-part of U.S.Ser. No. 445,090.

CODEN: USXXCO

DT Patent

LA English

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38, 72

FAN.CNT 3

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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	US 7459103	B2	20081202		
	US 20040110052	A1	20040610	US 2003-445090	20030523
				<--	
	US 7175930	B2	20070213		
PRAI	US 2002-382666P	P	20020523	<--	
	US 2003-445090	A2	20030523	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 20040166401	INCL	429044000; X42-344.500R; X25-250.0
	IPCI	H01B0001-00 [I,A]

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IPCPC01B0031-00 [I,C*]; C01B0031-02 [I,A];
      H01M0004-86 [I,C*]; H01M0004-86 [I,A];
      H01M0004-96 [I,C*]; H01M0004-96 [I,A];
      H01M0008-10 [I,C*]; H01M0008-10 [I,A];
      H01M0010-36 [I,C*]; H01M0010-40 [I,A];
      H01B0001-00 [I,C]; H01B0001-00 [I,A]
NCL252/500.000; 423/445.000R; 429/524.000;
      429/530.000; 429/532.000; 252/511.000;
      252/512.000; 252/514.000; 252/520.300
ECLA Y02E060:12B; Y02E060:52B2B
US 20040110052 IPCI H01M0008-10 [I,A]; H01M0004-00 [I,A]; H01B0001-06
      [I,A]
IPCPC01B0031-00 [I,C*]; C01B0031-02 [I,A];
      H01M0004-86 [I,C*]; H01M0004-86 [I,A];
      H01M0004-96 [I,C*]; H01M0004-96 [I,A];
      H01M0008-10 [I,C*]; H01M0008-10 [I,A];
      H01M0010-36 [I,C*]; H01M0010-40 [I,A];
      H01B0001-06 [I,C]; H01B0001-06 [I,A]; H01M0004-00
      [I,C]; H01M0004-00 [I,A]
NCL252/062.200; 252/511.000; 429/492.000;
      252/510.000; 429/524.000
ECLA Y02E060:12B; Y02E060:52B2B

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# ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB A composition comprising particulate carbonaceous material and a conducting polymer containing hetero atoms is disclosed. The composition can further comprise a metal. Devices comprising the composition can be constructed including supported electrocatalysts, membrane electrode assemblies, and fuel cells. A method for preparing the composition comprises oxidatively polymerizing with ozone a monomer of a conducting polymer containing hetero atoms in the presence of a carbonaceous material. The method grafts the conducting polymer to the carbonaceous material. The method can further comprise metalizing the polymer-grafted carbonaceous material.

ST conducting polymer grafted carbon material fuel cell use

IT Nanotubes  
(carbon; conducting polymer-grafted carbon material for fuel cell applications)

IT Conducting polymers  
Electric conductivity  
(conducting polymer-grafted carbon material for fuel cell applications)

IT Carbonaceous materials (technological products)  
Fullerenes  
Polyanilines  
(conducting polymer-grafted carbon material for fuel cell applications)

IT Catalysts  
(electrocatalysts; conducting polymer-grafted carbon material for fuel cell applications)

IT Coating process  
(metalization, platinization; conducting polymer-grafted carbon material for fuel cell applications)

IT Polymerization  
(oxidative; conducting polymer-grafted carbon material for fuel cell applications)

IT Carbon black, uses  
(polyaniline-grafted; conducting polymer-grafted carbon material for fuel cell applications)

IT Fuel cells  
(proton exchange membrane; conducting polymer-grafted carbon material for fuel cell applications)

IT 7440-06-4, Platinum, uses  
(conducting polymer-grafted carbon material for fuel cell applications)

IT 50-00-0, Formaldehyde, processes 302-01-2, Hydrazine, processes 592-06-3, Platinum cyanide (Pt(CN)<sub>2</sub>) 1333-74-0, Hydrogen, processes 7440-06-4D, Platinum, halides 7440-06-4D, Platinum, organic salts 7697-37-2D, Nitric acid, platinum salt 7803-49-8, Hydroxylamine, processes 10028-15-6, Ozone, processes 12627-62-2, Platinum sulfide 16940-66-2, Sodium borohydride 16941-12-1, Chloroplatinic acid  
(conducting polymer-grafted carbon material for fuel cell applications)

IT 7440-44-0DP, Carbon, conducting polymer-grafted 7782-42-5DP, Graphite, conducting polymer-grafted 25067-54-3DP, Polyfuran, carbon-grafted 25212-74-2DP, Poly(p-phenylene sulfide), carbon-grafted 25233-30-1DP, Polyaniline, carbon-grafted 25233-34-5DP, Polythiophene, carbon-grafted 25667-40-7DP, Poly(p-phenylene oxide), carbon-grafted 30604-81-0DP, Polypyrrole, carbon-grafted  
(conducting polymer-grafted carbon material for fuel cell applications)

OSC.G 5 THERE ARE 5 CAPLUS RECORDS THAT CITE THIS RECORD (5 CITINGS)

UPOS.G Date last citing reference entered STN: 16 Feb 2009

OS.G CAPLUS 2008:485606; 2006:875565; 2005:1028052; 2004:720536; 2004:609635

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L161 ANSWER 6 OF 10 HCAPLUS COPYRIGHT 2010 ACS on STN

AN 2003:454667 HCAPLUS Full-text

DN 139:9350

ED Entered STN: 13 Jun 2003

TI Method for preparation of coated carbon nanotube  
array electrodes for high performance rechargeable batteries

IN Chen, Jinghua; Huang, Zhongping; Wang, Dezhi; Wen, Jian; Ren,  
Zhifeng

PA The Trustees of Boston College, USA

SO PCT Int. Appl., 35 pp.

CODEN: PIXXD2

DT Patent

LA English

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38, 74, 76

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2003049219	A1	20030612	WO 2002-US38262	20021127
<p>W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW</p> <p>RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG</p>				
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US 20070134555	A1	20070614	US 2006-595561	20061109
US 7442284	B2	20081028		
PRAI US 2001-334328P	P	20011130	<--	
US 2002-305804	A3	20021127	<--	
WO 2002-US38262	W	20021127	<--	

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2003049219	IPCI	H01M0004-96 [ICM,7]; H01M0004-60 [ICS,7]; H01M0004-36 [ICS,7,C*]
	IPCR	H01G0009-00 [I,C*]; H01G0009-00 [I,A]; H01G0009-155 [I,C*]; H01G0009-155 [I,A];

H01L0051-00 [N,C\*]; H01L0051-00 [N,A];  
 H01L0051-05 [N,C\*]; H01L0051-30 [N,A];  
 H01M0004-02 [I,C\*]; H01M0004-02 [I,A];  
 H01M0004-36 [N,C\*]; H01M0004-36 [N,A];  
 H01M0004-60 [N,A]; H01M0004-66 [I,C\*];  
 H01M0004-66 [I,A]  
 ECLA H01G009/155; H01M004/02M; H01M004/66C;  
 T01L051:00M4D; T01M004:36K2; T01M004:60M;  
 Y01N004:00; T01L051:00M6D; Y02E060:12;  
 Y02E060:13; Y02E060:50  
 AU 2002357037 IPCI H01M0004-96 [ICM,7]; H01M0004-60 [ICS,7];  
 H01M0004-36 [ICS,7,C\*]  
 ECLA H01G009/155; H01M004/02M; H01M004/66C;  
 T01L051:00M4D; T01M004:36K2; T01M004:60M;  
 Y01N004:00; T01L051:00M6D; Y02E060:12;  
 Y02E060:13; Y02E060:50  
 US 20030143453 IPCI H01M0004-02 [I,A]; H01M0004-96 [I,A]; B05D0005-12  
 [I,A]; C25B0011-12 [I,A]; C25B0011-00 [I,C\*]  
 IPCR C25D0005-54 [I,C\*]; C25D0005-56 [I,A];  
 C25D0011-00 [I,C\*]; C25D0011-00 [I,A];  
 H01G0009-00 [I,C\*]; H01G0009-00 [I,A];  
 H01G0009-155 [I,C\*]; H01G0009-155 [I,A];  
 H01M0004-02 [I,C\*]; H01M0004-58 [I,C\*];  
 H01M0004-58 [I,A]; H01M0004-90 [I,C\*];  
 H01M0004-90 [I,A]; H01M0004-96 [I,C\*];  
 H01M0004-96 [I,A]; B05D0005-12 [I,C]; B05D0005-12  
 [I,A]; C25B0011-00 [I,C]; C25B0011-12 [I,A]  
 NCL 205/159.000; 205/317.000; 423/445.000B;  
 502/101.000; 977/842.000; 977/857.000;  
 429/209.000; 204/294.000; 427/113.000;  
 429/231.800; 429/532.000; 977/742.000;  
 977/948.000  
 ECLA H01G009/155; H01M004/133; H01M004/583;  
 H01M004/96; Y01N006:00; Y02E060:12B; Y02E060:13;  
 Y02E060:50  
 US 20070134555 IPCI H01M0004-66 [I,A]; H01M0004-60 [I,A]; H01M0004-36  
 [I,C\*]; H01M0004-04 [I,A]; H01M0004-66 [I,A]  
 IPCR H01M0004-66 [I,C]; H01M0004-66 [I,A]; C25D0005-54  
 [I,C\*]; C25D0005-56 [I,A]; C25D0011-00 [I,C\*];  
 C25D0011-00 [I,A]; H01G0009-00 [I,C\*];  
 H01G0009-00 [I,A]; H01G0009-155 [I,C\*];  
 H01G0009-155 [I,A]; H01M0004-02 [I,C\*];  
 H01M0004-36 [I,C]; H01M0004-58 [I,C\*];  
 H01M0004-58 [I,A]; H01M0004-60 [I,A]; H01M0004-90  
 [I,C\*]; H01M0004-90 [I,A]; H01M0004-96 [I,C\*];  
 H01M0004-96 [I,A]  
 NCL 429/245.000; 205/058.000; 429/213.000;  
 205/159.000; 204/294.000; 205/317.000  
 ECLA H01G009/155; H01M004/133; H01M004/583;  
 H01M004/96; Y01N006:00; Y02E060:12B; Y02E060:13;  
 Y02E060:50

# ASSIGNMENT HISTORY FOR US PATENT AVAILABLE IN LSUS DISPLAY FORMAT

AB The present invention provides conductive carbon nanotube (CNT) electrode materials comprising aligned CNT substrates coated with an elec. conducting polymer, and the fabrication of electrodes for use in high performance elec. energy storage devices. In particular, the present invention provides conductive CNTs electrode material whose elec. properties render them especially suitable for use in high efficiency rechargeable batteries. The present invention also provides methods for obtaining surface modified conductive CNT electrode materials comprising an array of individual linear,



aligned CNTs having a uniform surface coating of an elec. conductive polymer such as polypyrrole, and their use in elec. energy storage devices.

ST battery coated carbon nanotube array electrode

IT Nanotubes  
(carbon; method for preparation of coated carbon nanotube array electrodes for high performance rechargeable batteries)

IT Polymerization  
(electrochem.; method for preparation of coated carbon nanotube array electrodes for high performance rechargeable batteries)

IT Polymers, uses  
(metal-containing; method for preparation of coated carbon nanotube array electrodes for high performance rechargeable batteries)

IT Battery electrodes  
Capacitors  
Coating materials  
Conducting polymers  
Electrochromic imaging devices  
Electroluminescent devices  
Secondary batteries  
Sensors  
(method for preparation of coated carbon nanotube array electrodes for high performance rechargeable batteries)

IT Polyacetylenes, uses  
Polyanilines  
(method for preparation of coated carbon nanotube array electrodes for high performance rechargeable batteries)

IT Peroxy acids  
(organic; method for preparation of coated carbon nanotube array electrodes for high performance rechargeable batteries)

IT 7664-93-9, Sulfuric acid, uses 7697-37-2,  
Nitric acid, uses 7738-94-5, Chromic  
acid (H2CrO4) 25067-58-7, Polyacetylene 25233-30-1,  
Polyaniline 25233-34-5, Polythiophene 30604-81-0,  
Polypyrrole  
(method for preparation of coated carbon nanotube array electrodes for high performance rechargeable batteries)

IT 7440-44-0P, Carbon, uses  
(nanotubes; method for preparation of coated carbon nanotube array electrodes for high performance rechargeable batteries)

OSC.G 12 THERE ARE 12 CAPLUS RECORDS THAT CITE THIS RECORD (12 CITINGS)

UPOS.G Date last citing reference entered STN: 22 Feb 2010

OS.G CAPLUS 2006:1280868; 2004:739603; 2009:390515; 2007:1395157;  
2007:379250; 2006:542516; 2006:292737; 2006:234594;  
2006:117528; 2005:549761; 2005:284179; 2005:140862

RE.CNT 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD

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L161 ANSWER 7 OF 10 HCAPLUS COPYRIGHT 2010 ACS on STN  
AN 2004:127046 HCAPLUS Full-text  
DN 141:144485  
ED Entered STN: 17 Feb 2004  
TI One step synthesis of highly-pure soluble single-walled  
carbon nanotubes  
AU Maeda, Yutaka; Lian, Yongfu; Wakahara, Takatsugu; Kako, Masahiro;  
Akasaka, Takeshi; Choi, Nami; Tokumoto, Hiroshi; Kazaoui, Said;  
Minami, Nobutsugu  
CS Center for Tsukuba Advanced Research Alliance (TARA Center),  
University of Tsukuba, Tsukuba, 305-8577, Japan  
SO ITE Letters on Batteries, New Technologies & Medicine (2003  
, 4(6), 798-801  
CODEN: ILBMF9; ISSN: 1531-2046  
PB ITE-Hohwa Inc.  
DT Journal  
LA English  
CC 57-8 (Ceramics)  
Section cross-reference(s): 78  
AB Highly-pure soluble single-walled carbon nanotubes (s-SWNTs) were obtained by  
a one step method under mild conditions. The SWNTs were functionalized with  
long-hydrophobic groups by oxidation and amidation. Raman and near IR  
absorption spectra showed that the s-SWNTs maintain the inherent properties of  
the SWNTs.  
ST pure single walled carbon nanotube synthesis  
oxidn amidation soly  
IT Nanotubes  
(carbon, single-walled; one step synthesis of  
highly-pure soluble single-walled carbon nanotubes  
)  
IT IR spectra  
(near-IR; one step synthesis of highly-pure soluble single-walled  
carbon nanotubes)  
IT Amidation  
Firing (heat treating)  
Oxidation  
Solubility  
(one step synthesis of highly-pure soluble single-walled  
carbon nanotubes)  
IT 7440-44-0P, Carbon, preparation  
(nanotubes; one step synthesis of highly-pure soluble  
single-walled carbon nanotubes)  
IT 62-53-3, Aniline, reactions 68-12-2,  
N,N-Dimethylformamide, reactions 124-30-1, Octadecylamine  
538-75-0, Dicyclohexylcarbodiimide 7647-01-0, Hydrochloric  
acid, reactions 7664-93-9, Sulfuric acid  
, reactions 7719-09-7, Thionylchloride 7722-84-1, Hydrogen  
peroxide (H2O2), reactions  
(one step synthesis of highly-pure soluble single-walled  
carbon nanotubes)  
OSC.G 2 THERE ARE 2 CAPLUS RECORDS THAT CITE THIS RECORD (2  
CITINGS)  
UPOS.G Date last citing reference entered STN: 16 Feb 2009  
OS.G CAPLUS 2008:1057584; 2004:937071  
RE.CNT 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD  
RE CITED REFERENCES  
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L161 ANSWER 8 OF 10 CEABA-VTB COPYRIGHT 2010 DECHEMA on STN

AN 2005(09):5132 CEABA-VTB FS B Full-text

DN PVTB: 0510/599

TI Part II: From conducting polymers to carbon  
nanotubes: a revolution of sensors based on architectural  
diversity of the pi-conjugated structure  
Von leitenden Polymeren zu Kohlenstoffnanoröhrchen. Tl. 2:  
Revolution bei Sensoren auf Basis der architektonischen Vielfalt  
der pi-konjugierten Struktur

AU Dai, L.

CS Univ. of Dayton OH, US

SO Emergeia (2005) 16(3), 1,4-5

DT Journal

LA English

AB Self-assembly is used to facilitate the development of sensor chips (or sensor arrays) by adding multifunctional supramolecular structures to existing sensing devices and systems, thus enabling the identification of complex mixtures without separation. In this paper, a method is described using highly specific DNA hybridisation not only for a visual assay to check the exact locations of DNA molecules attached to nanotubes, but also to provide a means for self-assembling functional components on the nanotube surface for applications such as sensor chips. Carbon nanotubes, e.g. aligned multi-walled carbon nanotubes (MWNTs), were functionalised with the photoreactive reagent aziridothymidine (AZT) followed by coupling of ssDNA chains onto the carbon nanotube via the photoadduct. Then, the nanotube sidewalls were coated with cDNA-modified gold nanoparticles by DNA hybridisation. Transmission electron microscopy (TEM) showed the exact position of the cDNA-modified gold nanoparticles. DNA-directed self-assembly of ssDNA-MWNTs and ssDNA-single-walled carbon nanotubes (SWNTs) were achieved using cDNA-Au-nanoparticles. A wide range of multi-component structures was prepared for multifunctional material and device applications. This, together with polyaniline (PANI) nanotube synthesis via self-assembled sulphonated C(sub 60) supramolecular templates and the generation of conducting polymer micro-/nanocounters self-assembled around soap bubble templates, e.g. for nanoelectrodes and nanowires, clearly indicated the potential for supramolecular engineering, i.e. the broadened scope of multidimensional and multifunctional pi-conjugated structures for sensors and sensor chips. As an example, specific quantitative glucose detection with aligned nanotube-immobilised glucose oxidase was shown even in the presence of interfering species such as ascorbic acid, urea, and D-fructose. (Weckend, Bernd (Lohra-Altenvers))

- ABDE Teil 1 s. VtB-Nr. 0509/599 Selbstanordnung koennte durch Zufuegen multifunktionaler supramolekularer Strukturen zu bestehenden Sensorvorrichtungen und -systemen die Entwicklung von Sensorchips (oder Sensorarrays) vereinfachen und so die Identifizierung komplexer Mischungssysteme auch ohne Trennungen ermoeeglichen. Hier wurde eine Methode entwickelt, die hoch spezifische DNA-Hybridisierung nicht nur fuer einen visuellen Assay zur exakten Lokalisierung von an Nanoroehrehren gebundenen DNA-Molekuelen zu verwenden, sondern auch ein Mittel zur Verfuegung zu stellen fuer die Selbstanordnung funktioneller Komponenten auf der Nanoroehrehrenoberflaeche fuer Anwendungen wie Sensorchips. Kohlenstoffnanoroehrehren, z. B. ausgerichtete mehrwandige (MWNTs), wurden mit photoreaktiven Reagenzien wie Aziridothymidin (AZT) funktionalisiert, gefolgt von der Kopplung von ssDNA-Ketten an die Kohlenstoffnanoroehrehren ueber das Photoaddukt. Dann wurden die Nanoroehrehrenseitenwaende durch DNA-Hybridisierung mit cDNA-modifizierten Gold-Nanoteilchen beschichtet. Transmissionselektronenmikroskopie (TEM) zeigte die exakte Position der cDNA-modifizierten Gold-Nanoteilchen nahe bei den Nanoroehrehrenoberflaechen. Ausserdem wurde mit cDNA-Au-Nanoteilchen die direkte DNA-Selbstanordnung von ssDNA-MWNTs und ssDNA-Einzelwand-Kohlenstoffnanoroehrehren (SWNTs) erreicht. Damit wurde eine breite Vielfalt an Mehrkomponentenstrukturen fuer multifunktionelle Werkstoff- und Vorrichtungsanwendungen hergestellt. Das zusammen mit der Synthese von Polyanilin(PANI)-Nanoroehrehren mithilfe von selbst angeordneten supramolekularen sulfonierten C(sub 60)-Templaten und der Bildung von Mikro/Nanobehaeltern aus um Seifenblasen-Template selbst angeordneten, leitenden Polymeren, z. B. fuer Nanoelektroden und Nanodraehte, zeigt deutlich das Potenzial der Supramolekulartechnik, d. h. der Erweiterung multidimensionaler und multifunktionaler pi-Strukturen fuer Sensoren und Sensorchips. Als Beispiel wurde der spezifische quantitative Nachweis von Glucose mit auf ausgerichteten Nanoroehrehren immobilisierter Glucoseoxidase in Anwesenheit stoerender Spezies wie Ascorbinsaeure, Harnstoff und D-Fructose gezeigt. (Weckend, Bernd (Lohra-Altentrvers))
- CC 3KX Materials properties  
3KGB Minerals, natural/synthetic crystals, rocks  
3PZ Bioprocess engineering, biotechnology  
3KXU Chemical properties of materials, corrosion/erosion behaviour  
3PZ Bioprocess engineering, biotechnology  
3KXU Chemical properties of materials, corrosion/erosion behaviour  
3IF Measuring variables
- CT gold; sensor; biosensor; chip technology; pretreatment; fullerene; oxidase; immobilized enzyme; surface reaction; polyaniline
- L161 ANSWER 9 OF 10 CEABA-VTB COPYRIGHT 2010 DECHEMA on STN  
AN 2005(03):0454 CEABA-VTB FS V Full-text  
DN PVTB: 0504/454  
TI Water-soluble, exfoliated, nonroping single-wall carbon nanotubes  
Wasserloesliche, vereinzelte, nicht haftende, einwandige Kohlenstoff-Nanoroehrehren
- AU Hudson, J.L.; Casavant, M.J.; Tour, J.M.  
CS Rice Univ., Houston TX, US  
SO Journal of the American Chemical Society (2004) 126(36), 12 Reference(s), 11158-11159, 3f  
CODEN: JACSAT ISSN: 0002-7863
- DT Journal  
LA English
- AB Single-wall carbon nanotubes (SWNTs) are promising building blocks for high-performance composite materials, but their tendency to form bundles and/or flocculate in their unfunctionalised state is an obstacle to the full exploitation of their material properties. Several methods have been used to functionalise SWNTs, even with water-solubilising functional groups, but they

generally did not exfoliate the bundles to individually functionalised nanotubes. It has recently been reported that SWNTs disperse as individuals in superacids at SWNT concentrations of up to 10 weight%. Here, the solubility of SWNTs in fuming sulphuric acid was exploited for the efficient modified diazonium covalent functionalisation of SWNTs to achieve water-soluble unbundled individual SWNT-arylsulphonic acids. Sodium nitrate and diverse anilines were used for the functionalisation by covalent attachment of arenes to the purified SWNTs. Up to 1.5 g of SWNTs were reacted to up to 2.0 g of functionalised nanotubes. The unbundled, surface-roughened functionalised SWNTs had a diameter of 7 to 10 Angstroms. The process didn't require surfactant or polymer-based prewrapping, centrifugation, or sonication. Subsequent reactions such as desulphonation and sulphonyl derivatisation to esters or amides are being studied. (Weckend, Bernd (Lohra-Altenvers))

- ABDE Einwandige Kohlenstoff-Nanoroehrchen (SWNTs) sind viel versprechende Bausteine fuer Hochleistungsverbundwerkstoffe. Ihre Tendenz zur Bildung von Buendeln und/oder zur Flockung im nicht funktionalisierten Zustand ist aber ein Hindernis fuer die volle Ausnutzung ihrer Materialeigenschaften. SWNTs sind mit verschiedenen Methoden funktionalisiert worden, auch mit Wasserloeslichkeit gebenden funktionellen Gruppen, aber generell wurden sie dabei nicht zu individuellen funktionalisierten Nanoroehrchen vereinzelt. Kuerzlich ist berichtet worden, dass SWNTs in Supersaeuren bei SWNT-Konzentrationen bis zu 10 Ma% zu einzelnen Einheiten dispergiert werden. Hier wurde die Loeslichkeit von SWNTs in rauchender Schwefelsaeure ausgenutzt fuer die effiziente, kovalente modifizierte Diazonium -Funktionalisierung von SWNTs zu wasserloeslichen, nicht gebuendelten, individuellen SWNT-Arylsulfonsaeuren. Natriumnitrit und verschiedene Aniline wurden zur Funktionalisierung gereinigter SWNTs durch kovalente Bindung von Aromaten eingesetzt. Bis zu 1,5 g SWNTs wurden eingesetzt und bis zu 2,0 g funktionalisierte Nanoroehrchen erhalten. Die individuellen funktionalisierten SWNTs mit rauer Oberflaeche hatten Durchmesser von 0,7 bis 1,0 nm. Fuer den Prozess waren weder vorausgehende Entpackung mit Tensiden oder Polymeren noch Zentrifugation oder Beschallung erforderlich. Nachfolgende Reaktionen wie Desulfonierung und Sulfonylderivatisierung zu Estern oder Amiden werden derzeit untersucht. (Weckend, Bernd (Lohra-Altenvers))
- CC 3PLG Production of organic chemical final products  
3KGB Minerals, natural/synthetic crystals, rocks  
3KX Materials properties
- CT solubility; sulfuric acid; sulfonation;  
dispersion; carbon; nanotube; surface reaction
- L161 ANSWER 10 OF 10 CEABA-VTB COPYRIGHT 2010 DECHEMA on STN  
AN 2003(03):0504 CEABA-VTB FS V Full-text  
DN PVTB: 0304/175  
TI Structural characterization, optical properties, and improved solubility of carbon nanotubes functionalized with Wilkinson's catalysts  
Strukturelle Charakterisierung, optische Eigenschaften und verbesserte Loeslichkeit von durch Wilkinson-Katalysator funktionalisierten C-Nanoroehren
- AU Banerjee, S.; Wong, S.S.  
CS State Univ. of New York at Stony Brook, Stony Brook NY, USA;  
Brookhaven Nat. Lab., Upton NY, USA  
SO Journal of the American Chemical Society (2002) 124(30),  
47 Reference(s), 8940-8948, 7f  
CODEN: JACSAT ISSN: 0002-7863  
DT Journal  
LA English

- AB The various physical and physico-chemical properties of single-walled carbon nanotubes (SWNTs) are very important. The present paper discusses the solubilization of tubes through functionalization. Adducts of SWNTs are synthesized, characterized, then derivatized with Wilkinson's catalyst (tris-triphenylphosphine rhodium(I) chloride). SWNTs functionalized with Wilkinson's catalyst are readily soluble and stable in various organic solvents. The use of nanotubes as catalytic supports (specially for very expensive catalyst materials) is economic, as the tubes are recoverable from solution very easily. The nanotubes are synthesized from raw SWNTs (containing about 30% metal catalyst) by oxidizing with acidic  $\text{KMnO}_4$  followed by washing with HCl and water. removing most of the amorphous carbon and metal particles from the nanotubes in the process (revealed by SEM and XRD). The purified tubes are dried at 100 Cel and again dispersed in DMSO solvent after ultrasonication. The different characterization techniques adopted for the adduct were NMR, XRD, TEM, SEM, AFM, EDAX, UV-visible, near-IR and luminescence. The catalytic properties and reactivity of this product is comparable to the normal Wilkinson catalysts in the hydroformylation of alkenes. (informindia)
- ABDE Die Wechselwirkungen zwischen Struktur und elektrischen sowie elektrochemischen Eigenschaften von einwandigen Kohlenstoff-Nanoröhren können durch spezifische Derivatisierungen erheblich verstärkt werden. Die Intensität derartiger Funktionalisierungsversuche (z. B. elektrochemische Reduktion von Aryldiazoniumsalzen, dipolare 1,3-Cycloaddition von Azomethinyliden) nimmt nicht zuletzt aufgrund des potentiellen Einsatzes dieser chemisch modifizierten C-Nanoröhren als Katalysatorträger stetig zu. Die Verf. beschreiben die Synthese, die systematische Charakterisierung und den katalytischen Einsatz von C-Nanoröhren, die durch den fuer Hydrierungen sowie Hydroformylierungen von Alkenen in homogener Lösung essentiellen Wilkinson-Katalysator  $[\text{RhCl}(\text{PPh}_3)_3]$  komplexiert und folglich funktionalisiert wurden. Die durch die LASER-Ofen-Methode präparierten, durch Oxidation mit einer sauren  $\text{KMnO}_4$ -Lösung nahezu vollständig von störenden Beiprodukten (z. B. Reste von Ni- und Co-Katalysatormaterial) gereinigten C-Nanoröhren werden unter Ultraschall in Dimethylsulfoxid (DMSO) dispergiert. Der in einer Schlenk-Apparatur vorgelegten Dispersion wird unter stetem Rühren der in DMSO gelöste Wilkinson-Katalysator zugeprofft. Das feste Produkt lässt sich nach 80-stündiger Reaktionszeit (55 bis 60 Cel) und sukzessivem Waschen in DMSO, Ethanol und Wasser isolieren. Die durch Komplexierung geschaffenen Rhodium-Sauerstoff-Bindungen und die dadurch hervorgerufene Abschwächung der zwischen den C-Nanoröhren herrschenden Van-der-Waals-Kräfte konnten mittels Pulver-Röntgendiffraktometrie, (<sup>1</sup>H-, (<sup>13</sup>C- und (<sup>31</sup>P)-NMR-Spektroskopie, Elektronenmikroskopie (TEM, SEM), Rasterkraftmikroskopie und UV-VIS-Spektroskopie illustriert werden. Die resultierende, effektive Dispergierung der funktionalisierten C-Nanoröhren führt zu einer deutlich erhöhten Löslichkeit in DMSO (150 mg/l gegenüber 4 bis 10 mg/l fuer nicht funktionalisierte C-Nanoröhren). Die komplexierten C-Nanoröhren lassen sich problemlos rezyklisieren und sollten sich vorzüglich als Alternative zu den kostenintensiven, metallischen Katalysatorträgern eignen. Der präparierte Komplex katalysiert die Hydrierung von Cyclohexan bei Raumtemperatur und ist somit das erste Beispiel eines auf C-Nanoröhren basierenden Katalysators fuer die homogene Katalyse. (Gablenz, Silvio (FH Jena))
- CC 3PL Chemical engineering, chemical reaction engineering  
3PLA Chemical equilibrium, kinetics, catalysis, chemical solutions
- CT 3PLA Chemical equilibrium, kinetics, catalysis, chemical solutions  
catalytic reaction; solubility; electrochemistry; nmr; mechanical property; catalyst activity; electrochemical process; luminescence; carbon